

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

FOREIGN MINING AND METALLURGY.

er bad the present condition of the Belgian iron trade may be, however rare orders may be, and however depressing the tone of affairs generally, all the great Belgian works discontinue in the future, and they are making their preparations accordingly. Almost all of them have under consideration the enlargement or transformation of their works, and they are even now carrying out improvements. For the time being there is a general fall, and if everyone understands that some are necessary, there may be readily less agreement as to the extent of those sacrifices. A proof of this was afforded at a reduction of a contract for brakes for coke and mineral trucks, signed from 1868 to 1874 for a single lot, or nearly 100 per cent. The three lowest tenders made were those of M. de Malines, M. Cabany, and MM. Chevalier Cheylus and Co. at price for the whole of the three lots submitted for consideration offered by MM. Chevalier Cheylus and Co., whose works are in the Ardennes. It is a long time since a French firm has thus achieved a victory in Belgium. The circle has not, however, excited much uneasiness among Belgians, who regard it as a natural consequence of the bizarre though which the iron trade of Europe is at present passing. A Decree, dated Sept. 30, 1873, M. Charles Delloye-Mathieu authorised to add to his works at Marchin three puddling-furnaces for plates, and the necessary steam-engines. At improvement is noted in the tone of the French iron trade. The retrograde movement in prices has experienced a slight revival in the demand for certain grades. There have been no great transactions, and prices have remained rather because there has been no occasion to discuss for any other reason. Some merchants are giving out for reassortments, because their stocks are exhausted, but appear to think of reconstituting them seriously, and only reduced current of orders is received. Pig is neglected, and cast-furnaces are being blown out, but still there appear to be of an improvement rather than an aggravation in the market. At the last adjudication for brakes for the Belgian State, MM. Chevalier Cheylus and Co., a French firm, tendered only. Rails have been better supported in France than other countries. There must be a demand for rails, if only for the maintenance of existing lines, and this gives employment to some rolls. Prices are maintained at about 12½ 8s. per ton, but it is that contracts could be carried through upon lower terms. At St. Etienne the market has exhibited a certain animosity, iron is quoted at 12½ per ton, but with a reduced between the different classes.

ntly upward tendency has been remarked upon the Paris market, but it can scarcely be regarded as real in presence of favourable tone of the English copper markets. At Havre, in bars is quoted nominally at 88½ to 90½ per ton. Copper a little firmer at Marseilles, notwithstanding the advance in England. The German copper markets have been weak, and transactions have been limited to the requirements of the moment. At Paris, Banca tin, delivered at Havre or Paris, is 130½ per ton; Straits 130½, and English 128½ per ton. The crisis in the United States has occasioned a decline in tin prices; ingots have realised 134½ per ton. There has not been business passing in tin at Amsterdam; at the same time, prices are less firmly supported. At Rotterdam the tin market has been more animated; some rather heavy lots of Billiton have been sold at 70½ fls. to 71 fls., while Banca has brought 71½ fls. There have been no very heavy transactions in tin in Germany. On the market lead has exhibited a slightly upward tendency; lead, delivered at Paris, has made 24½, and Spanish, delivered at 24½ 4s. per ton. The Marseilles lead market has been quiet. Many the lead markets have been in an almost colourless state; of Spanish lead are almost entirely exhausted in Germany, and arrivals are expected for some time. A slight fall in Silica has been reported at Paris. In Germany zinc quotations are firmly maintained, but there has been no great amount of passing.

intelligence which reaches us as to the French coal trade presents points of novelty. The season advances it is true, but there is no increase of activity in the coal markets. The stocks have been laid in for the winter have been less important than many persons, instructed by the experience of the last ten years, deemed it advisable to exhibit quite an excess of prudence. Maintenance of prices during the summer has also checked this advance in quotations usually observable on the advent of winter. It is stated that colliery owners have been making this considerable deliveries to beetroot sugar manufacturers by arrangement. In the Paris district industry is at present in rather a bad state; the metallurgical interest is, however, more hopeful than a month since. In the basin of the Nord there is the state of affairs; prices are maintained as regards small contracts from large customers would be accepted at slightly rates. Some recent arrivals of English coal are stated to have in satisfaction in the Nord.

outh of Charleroi Blast Furnaces Company has declared a dividend of 11 4s. per share; the total profits of the Courcelles-Nord Company for the current year are estimated at 140,000; it is stated to discuss at present, however, what division will be among the shares. The Belle Vue Saint Laurent Colliery Company just paid an interim dividend of 2½ per share; a supplementary dividend of 5½ per share will probably be paid in April, 1874. The Essin Blast Furnaces Company has declared a dividend of 10s.

ies of coal for the winter are being laid in in Belgium, but the coal trade maintains its animation it is far from present feverish activity which it has exhibited in former years, and an influx of orders during the summer induced some anti-anticipation. One favourable consequence of the coal crisis has been that supplies have been laid in sooner than usual this year; and this will obviate the transport difficulties which have been attended with such unfortunate consequences to the closing months of each year. There are some

complaints, it is true, of insufficient supplies of plant being furnished by the Administration of the Belgian State lines, and by sundry companies, but everything leads to the belief that these complaints are of a local and temporary character, and that they are not likely to increase. Traffic is encumbered on the Luxembourg lines, and at many other points, but there is an expectation that these difficulties will soon disappear, as the managers have ample means for providing for the unfortunately reduced traffic of many sadly depressed industries. The Eastern of France Railway Company has just concluded a contract with the Administration of the Prussian Government mines at Saarbrück for the delivery of 120,000 tons of coal per annum for a term of ten years, dating from Jan. 1, 1874. The price to be charged for this coal is to be fixed monthly. Hitherto the Eastern of France Company has only taken 40,000 to 50,000 tons annually from the Saarbrück Mines, and has purchased 70,000 tons to 80,000 tons of coal and briquettes in Belgium. The Belgian coal-owners have thus lost a good client. Prices of coal remain without variation in Belgium, but the least incident might bring about a fall.

PEAT AS FUEL—No. V.

SIR,—Having in my previous letters described those of the numerous systems of treating peat which merit attention, I now propose to go back to the point from which I started, and consider, first, the process employed by nature in the formation of peat bogs; next, the varieties and peculiarities of those plants of which peat is composed; and, lastly, the collateral circumstances under which these plants have been converted into peat, and the inherent properties of the product resulting from the phenomenon.

The origin of peat bogs has been explained as follows by Mr. Nimmo:—"In cases where clay is spread over gravel, and the waters of floods or springs are prevented from escaping, muddy pools are formed, round the borders of which aquatic plants accumulate, and gradually creeping towards the deep centre, mud having accumulated round their roots and stalks, a spongy semi-fluid mass is formed, well adapted to the growth of moss, which, together with spears of the spagnum, now luxuriates; this absorbs a large quantity of water, and continues to shoot out new plants above while the old one is decaying and being compressed into a solid mass below. In this way the water is replaced or absorbed by vegetable matter, and the marsh is filled up, while the moister portion, growing more rapidly, gradually rises above the edges, until the whole surface has attained an elevation sufficient to discharge the surface water. In mountain districts the moisture is supplied by clouds and mists, and one generation of vegetable matter flourishes upon the ruins of its predecessor."

The more clayey the rock or soil below, the deeper is the formation of peat. Such is the theory of the formation of peat bogs. As the plants which form turf are in different stages of decomposition, the aspect and constitution of the bog vary considerably. Near its surface the peat is light-coloured and spongy, and contains the vegetable matter but little altered; at some depth it is brown, denser, and in a more decomposed state, while at the basis of the bog, some of which are 40 ft. deep, the colour of the turf is black, and its density and chemical composition nearly equal to those of fossil coal.

The plants of which peat is formed belong, generally speaking, to the moss, lichen, or cryptogam class. They are soft, mucilaginous, and only of annual growth. As regards their internal structure, they are made up of rather large compartments formed of very thin layers of cellulose, in which compartments the juices and mineral parts of the plants are deposited. They contain a particular substance called lichenite, which, together with vegetable albumen, forms, when in contact with water, a mixture possessing a gummy and sirupy appearance. To give a better idea of the nature of these bodies when mixed with or dissolved in water, it is but necessary to remember what kind of mixture is formed when althaea for a certain time is digested in its own weight of water. Recent peat contains, therefore, three different bodies that invite special attention:—

1.—The cellulose, or lignine, which is the name given to the substance of which the sides of the cells of wood or of other plants are formed. It is white, amorphous, and very elastic. In its greatest purity cellulose is shown to us by cotton; it also forms the centre part of the willow tree, in which it occurs in great abundance; paper also consists of nearly pure cellulose. Some importance must be attached to it in the case of peat, forming as it does, one of those difficulties which it is necessary to grapple with in the treatment of that material. Cellulose is but little acted upon by acids, nor by cold water either, save after a very considerable length of time, and this accounts, to a great extent, for the spongy nature of peat, which, in fact, is partly owing to the cellulose it contains. The ultimate composition of cellulose is carbon, oxygen, and hydrogen. It may be observed here that in cellulose oxygen and hydrogen are contained in exactly those proportions that are requisite to form water, and, in fact, when that substance is decomposed by air or by heat it yields carbon and water.

2.—The component of peat that is to be examined next is lichenite. There is but little to be said about it. It is a mucilaginous, gummy kind of substance, which, when brought into contact with water, swells, and assumes the appearance of starch. It then forms an adhesive oily-looking paste, and prevents the water which it is in contact with from being evaporated. Lichenite can be dissolved by only a very large quantity of water, a fact showing why the processes that are diluting peat with much water succeed in producing a compact fuel. The two preceding substances are commonly affected only by boiling water when they exist in certain soft plants, such as those of which peat is formed.

3.—Vegetable albumin is the third substance that claims attention. In a certain sense it gives less trouble than either cellulose or lichenite, because it is more easily decomposed by fermentation, and there is now a sad example of the effect of such fermentation near the town of Dunmore, in Ireland. A peat bog there has burst its bounds, natural and artificial, and is reported to travel towards the town at the rate of 12 ft. per 24 hours. This unfortunate accident has already cost 300 acres of arable land, which it has covered with 6 ft. of a gelatinous, pulpy mass, and three farms which it has destroyed on its way down the valley. That it is due to a considerable expansion of the material caused by the internal fermentation of the bog there can be but little doubt. Albumin, before ferment-

ing, forms a mucilage in newly-formed peat. It exists in the cells constituted by cellulose. The ultimate result of its decomposition is the production of acetic acid, ammonia, and water. The composition of this body has not yet been accurately ascertained. By its chemical properties it closely resembles the casein of milk.

Such are the properties of the three principal components of the plants of which peat is formed. As regards the mineral part and the lignite, which also enter into the composition of peat, though but on a small scale, the latter specially, I need say nothing about them here. I confine myself for the present to the remarks I have made on the structure of the plants that have been decomposed into peat whatever their actual appearance and their species may have been. The breaking-up, or rather the chemical destruction, of the substances alluded to would certainly go a long way to the solution of the vexed question of the utilisation of peat as fuel. That such a solution will be ultimately arrived at I have but little doubt whatsoever, but when this consummation will take place I am not prepared to say.

I have commenced a series of experiments, all of them tending to that end. If my labours are attended with success, and full results, I shall be happy to lay these before your readers, but should my endeavours prove nugatory in the end it will be better for me to say nothing more on the matter. For the present I may confine myself to saying that the more I devote my attention to the subject the more I find it bristling with unlooked-for difficulties, and the humble advice I would give to all intending investors is not to sink any of their spare cash in any of the numerous attempts at the solution of the problem without having previously closely investigated the real merits of the proposals.

A. VASSARD.

7, Carlton-square, New Cross, Oct. 21.

THE DAVIS MERTHYR COLLIERY COMPANY.

SIR,—A notice having appeared in the last published list of new companies of the registration of a company calling itself "Davis Merthyr Colliery Company," I am requested to state that D. Davis and Sons have no connection with this company; that their collieries, known for many years as "Davis's Merthyr Collieries," are quite distinct from any possessed by the company referred to, and that D. Davis and Sons demur to the right of any individual or corporation thus to make use of their name.

CHARLES HULL,

15, Leadenhall-street. Agent for Davis Merthyr Collieries.

THE ALLEGED DISCOVERY OF HEMATITE ORE IN SHROPSHIRE.

SIR,—A short time since a paragraph with this heading went the round of the London and provincial newspapers, exciting a good deal of interest and speculation among ironmasters, particularly those of Shropshire and South Staffordshire, and to a gentleman connected with a firm in this county well known for the quality of their cold-blast iron I am indebted for an opportunity of investigating the matter, the result of which is now placed before the reader. In the paragraph alluded to the locality was not stated, and the absence of definite information invested the discovery with a degree of mystery which led to the supposition that it was really too good a thing to make public all at once. Suspecting that the locality was in the neighbourhood of the Lawley and Caradoc Hills, with satchel on shoulder and hammer in hand I ventured on a clear sunny autumn day on a stroll in that direction. Threading the field paths and winding bushy lanes that lead into Watling-street, the old Roman Road running along the east side of the Caradoc (or Querdoc, as it is called), and following the old Cardington Road over the high ground west of the Lawley, I arrived at a place near the Netchleys, where an old quarry, which has been worked for 30 years past, appears on the right. Close by the latter, where the rocks have been tilted and thrown almost into vertical positions, a shaft has been sunk to a depth of 8 yards on to a vein of ore, which up to the time of our visit had not been proved to be more than 1½ in. to 2 in. thick. The quality may be good or it may not, we cannot say, but no evidence is afforded by the rocks in which the shaft is sunk or in rocks of the immediate neighbourhood to justify the belief that it will expand or lead to a bed or hematite ore beneath. The rocks in which the vein occurs belong to the Llandovey formation, which overlies the Caradoc sandstone. Each crops out in turn on the sides of the hill, and, therefore, affords an opportunity of judging of the probability of a bed of iron ore or otherwise in the rocks below, and my opinion is that there is none whatever, and that it will never yield sufficient for a single charge even for one of our Shropshire furnaces.

At several places near, on the flat below, old shafts may be seen where attempts have been made to find coal, some few traces of which, as well as ironstone, may be observed on the banks. A good deal of money has been spent and a good deal of patience exhausted in fruitless attempts to find near the foot of the Caradoc and that of the Lawley the more profitable coal seams which have been worked at Leebotwood, Westbury, and Uffington; but anyone who understands the real nature of the formation, and reflects upon the circumstances under which these small carbonaceous patches were formed, would scarcely expect to find anything worth the trouble and expense of the sinking. The fact is, there are just sufficient indications of coal measures to tempt the unwary, without a prospect of the more solid advantages necessary to reward explorers. They are the mere shreds and fringes of the Uffington, Leebotwood, and Pontesbury measures, the whole carboniferous strata of the district having been formed in bays or troughs, in the centre of which the strata thickens as at Leebotwood, and become attenuated as they approach the sides of the basin.

Although of so little value, commercially considered, they are highly interesting geologically considered, as affording chronological data with respect to the more productive fields at Coalbrookdale, Dawley, and St. George's. They are associated with the same remarkable bed of limestone referred to in connection with the upper and younger seams of Linley Brook, which, from its peculiar organic remains and mineral compositions, is so readily distinguishable, and which is so remarkably persistent when followed along the sinuosities of its course for a space of nearly 40 miles from Linley Brook, or (say) 20 miles in a straight line. Bentley Ford is a place much talked of as affording inducements for sinking in search of coal and ironstone, and two or more shafts have been sunk, which are now covered over. Bentley Ford is situated near the north-

eastern termination of Lawley. These upper carboniferous measures appear upon the surface in sufficient quantities, and bearing appearances which may well tempt explorations for coal in a district where it is so dear. These shales, sandstones, patches of ore, and occasionally coal, however, are but the tapering and wedging out extensions of the Leebotwood series, which died away and came to nothing, against the slopes of the older hills which formed the margin of the bays in which they were deposited. J. RANDALL.

Madley, Oct. 22

ROCK BORERS.

Sir,—Your correspondent, Mr. Wasley, will oblige me, with many of your readers, by stating the total length of the Kainotomon drill, the diameter of the cylinder, length of cylinder, number of cubic inches of steam or air required per stroke, if the tappet gear is likely to stand the wear and tear of twelve months constant work. With regard to Ball's drill, I believe it belongs to the Kainotomon and Power jumper—a striking family, the tappet with its valve plate being knocked up and down by the face of the piston. In the illustration of this drill, the length of the cutting bar is equal to the earth's diameter, (say) 8000 miles, and the weight of an inch drill would, therefore, exceed 62,000 tons, this enormous weight being exclusive of weight of piston and rod. What number of cubic inches of steam or air does this drill use per stroke? From Mr. Wasley's letter I infer that the Burleigh did not in some way answer his expectations, neither do I think that any number of the striking or knocking down family will prove steady, reliable, and regular servants. A drill to be thoroughly useful must have but few members, and the valve movement in no way connected with the blow. It is well enough to mask the working parts to give drills a respectable appearance, and to force their sale, but the miner does not want an obstinate, filthy, ill-constituted slave; he requires a plain, free-going, economical servant. For the one he will acquire an unmitigated dislike; the other will become his trusted, indispensable assistant. London, Oct. 21.

TIN DRESSING, AND BLASTING WET GROUND.

Sir,—I thank you for inserting in the Journal of Sept. 27 my communication respecting the improvements in Tin Dressing and Blasting Wet Ground. As it seems, however, to have been taken but little notice of, I again assert that I will go further—that I will venture to lay down a plan, provided a small space shall be allowed me at the foot of their floors. I will venture to do it two different ways. First, I will divide every class of tin from the rough or crop to the finest tin, if required; the finer the tin the better for my principle. The division shall be governed by the size and weight of the grain. I will then send the slime away with no mineral in it. Secondly, I will save all the tin, and nearly all slime, so that no river shall be dirty with it, and I will do it under those conditions. If a failure I will take nothing for my trouble, but if a success I think I am fairly entitled to share some of the 40,000, which will be saved from going into the Red or any other River. My principle is so simple, and the expense such a trifle, that no company need to fear the trial, for now it seems by some to be held doubtful whether it can be accomplished or not, and by others very anxious it should be tried; therefore, I am prepared to show the plan to any gentleman who may take any interest in the matter upon fair conditions. I should be glad if the matter were taken up, as it would be the means of preventing the sarcasms that are being cast upon the agents concerned, believing as I do, that the system of cleaning is bad. R. MOORE.

East Vifor Tin Mines, North Bovey, Oct. 22.

RAILWAY PASSENGER AND GOODS TRAFFIC.

Sir,—The misconception which appears to have arisen with regard to Mr. Mulvan's proposition for opening up a German route to India would be regrettable were it at all calculated to interfere with the carrying out of the project, but I think that so far from having this effect it will rather promote it by directing a larger amount of attention to it. The provision of four lines of railway at large stations has long been extensively adopted in this country, and has proved excessively convenient, even where there is comparatively little goods traffic, as an instance of which I might mention Norwood Junction, and, I believe, Stafford, as well as many other places; so that if Mr. Mulvan only proposes separate lines to avoid interference with the fast trains, there is certainly nothing Utopian in his suggestion, which appears to me, giving it that reading, to be merely proposing a system for Germany (where I suppose it is not adopted) which is proved by experience in this country to be an excellent one. In connection with Mr. Mulvan's proposition, it would be satisfactory to learn how many miles of English railroad are provided with a separate line for goods or mineral traffic, and in these cases how much passenger traffic and goods traffic respectively passes over the lines. For myself, I have never seen four lines that is two lines for goods and two for passengers even on those English lines which have the heaviest traffic; but some, the North-Western for example, have a third line, nominally called the goods line, over a portion of their road. This goods line, however, is not exclusively reserved for goods, but is largely used for the slow passenger traffic; that is, when it is desirable to send along an express train which interferes with the ordinary traffic the ordinary train is run on the goods line. Now, although the North-Western runs the best expresses between London and Manchester, I believe the three lines give them all the practical facilities that could be desired. It may involve some little consideration once or twice in a year to the timing that would be avoided if there were four lines, but I do not think the fourth line would prevent a single accident or secure the shareholders a shilling per annum extra profit.

If this be true in England, where the trains are acknowledged to be run far more frequently than is necessary to carry the amount of traffic which passes over them, I can quite understand that Mr. Mulvan's proposition to make the provision of four lines at the stations the rule rather than the exception (as it is in this country), would give him a railway with only two lines between stations over which he could carry fifty times the traffic which would be brought to it. The result and advantage of this arrangement were entirely overlooked in the article which appeared in the *Mining Journal* of Oct. 4, and hence the misconception; by it we are enabled to keep the working line from terminus to terminus, and from one year's end to another, without a standing train upon it, so that, with ordinary care, accidents become almost impossible, and the one pair of lines afford all the facilities for combined goods and passenger traffic which can be desired anywhere but in London and the suburbs of London, where, of course, the circumstances are exceptional. It will be easy to make this intelligible, even to non-practical readers, who will then see the carelessness that must have existed in attributing to a man of Mr. Mulvan's experience a suggestion to lay four lines of rails over a road many hundreds of miles long, and requiring comparatively few chief stations. The system of doubling at stations only involves a small additional outlay where the outlay can be turned to practical account, whilst to lay four lines throughout would make the realization of profit impossible.

That the system may be readily understood, let Flushing and St. Petersburg be taken as the two termini. There would then be an up-line and a down-line laid the entire distance, and no train would be permitted to stop on either of these, except at Flushing or at St. Petersburg. Trains carrying passengers or goods for any intermediate station would be turned out into one or other of the second pair of lines, by the side of which the platforms, &c., would be constructed. The passengers having got into or out of the train the latter would continue its course, passing by the remaining portion of the loop to the main line, which it has previously left for the purpose of stopping. Now, in practice, there is no difficulty in arranging for the fast trains to pass the slow trains, whilst the latter are standing at the station, and the greatest inconvenience at all likely to result is the detaining of the slow train for a few minutes in consequence of the express not being absolutely punctual. But as it is considered an excellent service on the Continent if there be a couple of express trains and half-a-dozen stopping trains in the course of the day, it will be seen that there would be a large margin for increase of traffic, without necessitating the serious considera-

tion of increasing the number of lines. I quite believe that the routes proposed by Mr. Mulvan are destined to be largely developed, and trust no time will be lost in getting the whole system in working order.—London, Oct. 22.

THE MINES AND MINING DISTRICTS OF UTAH.

THE DISTRICTS OF THE WAHSAATCH RANGE.

THE COTTONWOODS—(continued).

Sir,—In addition to the information in the following paper, I append a table containing a list of the other principal locations in the district, which space would not permit me to describe more fully, giving the name, date of record, name of one of the locators, and the number of feet contained in the mine. This information was kindly furnished to me by the Recorder of the district, and is a reliable record of the location and extent of these claims, which, as a reference, will prove very valuable, besides being a partial abstract of the title:—

| Name of Lode. | Date of Record. | Name of Locator. | No. of feet. |
|--------------------------|-----------------|--------------------------|--------------|
| Monitor and Magnet | Aug. 20, 1868 | W. S. Woodhull, et al. | 2200 |
| Johanna | Oct. 16, 1868 | William Rives, et al. | 2000 |
| Western Star | Oct. 23, 1868 | Titus Axen, et al. | 2000 |
| South Star | Oct. 20, 1868 | Alex. Talbot, et al. | 1600 |
| Chicago | July 9, 1869 | G. L. Howard | 1600 |
| Chadnatti | July 16, 1869 | James Smith | 1800 |
| Illinois Tunnel | July 16, 1869 | James Smith | — |
| Caledonia | July 25, 1869 | Henry Anderson | 1200 |
| Diamond | Aug. 20, 1869 | G. L. Howard | 1200 |
| Morning Star | Nov. 11, 1869 | Titus Axen | 3000 |
| Lavinia | Feb. 25, 1870 | N. Groesbeck | 1800 |
| Emma | March 2, 1870 | J. F. Woodman | 2400 |
| Creek | March 2, 1870 | R. H. Robertson | 2000 |
| Powerful | March 2, 1870 | R. H. Robertson | 2000 |
| Silver | March 2, 1870 | R. H. Robertson | 2000 |
| Copper | March 2, 1870 | R. H. Robertson | 2000 |
| Galena | March 2, 1870 | R. H. Robertson | 2000 |
| Pauline | March 2, 1870 | R. H. Robertson | 2000 |
| Colfax | March 19, 1870 | John Snyder | 3000 |
| Flagstaff | April 7, 1870 | Joseph I. Wing | 2200 |
| Grizzly | April 18, 1870 | O. P. Rockwell, et al. | 3000 |
| Gladstone Tunnel | April 28, 1870 | W. S. Woodhull | — |
| Prince of Wales | April 28, 1870 | Richard Gill | 1000 |
| Brady | April 28, 1870 | Richard Gill | 1000 |
| Jenny Lind | April 28, 1870 | Richard Gill | 1000 |
| California | April 28, 1870 | Richard Gill | 1000 |
| Kate Hayes | April 28, 1870 | Richard Gill | 1000 |
| Habana | April 28, 1870 | Richard Gill | 1000 |
| Paris | April 28, 1870 | Richard Gill | 1000 |
| Webster | April 28, 1870 | Richard Gill | 1000 |
| Filmore | April 28, 1870 | Richard Gill | 1000 |
| May Ann | April 28, 1870 | Richard Gill | 1000 |
| Stockton | April 28, 1870 | Richard Gill | 1000 |
| Burlington | April 28, 1870 | Richard Gill | 1000 |
| White Cloud | May 9, 1870 | J. W. Elliott, et al. | 1200 |
| Halo | May 28, 1870 | J. W. Wilson | 1200 |
| Home Ticket | May 27, 1870 | G. L. Howard | 2000 |
| Revolution | June 1, 1870 | J. P. Harlow | 2000 |
| Darlington | June 20, 1870 | John Shay, et al. | 1400 |
| Montezuma | June 21, 1870 | John Shay, et al. | 1100 |
| Emmett | June 22, 1870 | R. E. Ireland | 1600 |
| Gopher | June 27, 1870 | A. J. Despain | 3000 |
| Liliawh | June 14, 1870 | Levi North | 1000 |
| Hiawatha | June 14, 1870 | A. J. Despain | 3000 |
| Stoker | June 17, 1870 | J. Stoker | 1200 |
| Davenport | June 17, 1870 | Tim Sullivan | 1800 |
| Rock Island | June 29, 1870 | J. W. Elliott | 1200 |
| Rafter | June 29, 1870 | J. Richardson | 1000 |
| City Rock | June 29, 1870 | Swan Johnson | 1000 |
| Strider | June 29, 1870 | James Montgomery | 1000 |
| Wellington | July 8, 1870 | Byron Groo, et al. | 2000 |
| Regulator | July 19, 1870 | Thos. Butterwood, et al. | 1000 |
| Savage | July 10, 1870 | J. Johnson | 1400 |
| Excelsior | July 27, 1870 | F. Chorpending | 1400 |
| Uncle Sam | Aug. 10, 1870 | J. M. O'Connell | 1400 |
| Elephant | Sept. 12, 1870 | M. H. Vinson | 1600 |
| Vanderbilt | Aug. 10, 1870 | James Larsen | 1000 |
| Relief | Oct. 11, 1870 | R. F. Dewey | 1400 |
| Crozier Prince | Oct. 12, 1870 | L. V. Winans | 1000 |
| Frederic | Oct. 12, 1870 | M. K. Harkness | 1600 |
| Daisy | Oct. 12, 1870 | M. K. Harkness | 1600 |
| Peachontas | Oct. 14, 1870 | R. F. Dewey | 1400 |
| Lofty | Oct. 24, 1870 | M. Davis | 1400 |
| Fanny Wetzel | Nov. 4, 1870 | W. K. Rice | 1400 |
| Cheyenne | Nov. 4, 1870 | W. H. Harlow | 1400 |
| Cedar | May 10, 1871 | Josephine Snyder | 1200 |
| Gumbert | April 29, 1871 | Charles Neak | 1200 |
| Umbertland | May 22, 1871 | Mike Welch | 1000 |
| Boatman | May 20, 1871 | N. C. Boatman | 1000 |
| Fuller | June 2, 1871 | P. F. Fuller | 1200 |
| Utah Tunnel | June 7, 1871 | L. Seaman | 500 |
| Rafter No. 2 | June 15, 1871 | Thomas Keams | 1400 |
| Highland Chief | June 15, 1871 | Robert Ellis | 1400 |
| Battle | May 14, 1871 | R. F. Dewey | 1200 |
| Green Mountain | May 17, 1871 | R. F. Dewey | 1400 |
| Verdant Bird | June 21, 1871 | Mike Lynch | 1400 |
| Walrus Tunnel | June 21, 1871 | William Wallace | — |
| Emily | June 22, 1871 | D. W. Rench | 1000 |
| New York | June 15, 1871 | H. J. Toller, et al. | 800 |
| Matilda | July 3, 1871 | James Larsen | 1000 |
| Oxford | July 7, 1871 | H. J. Toller, et al. | 800 |
| Phoenix Tunnel | July 19, 1871 | R. E. Thompson | 1400 |
| Savoy | June 21, 1871 | T. H. Orny | 1400 |
| Florida | July 22, 1871 | J. McCulloch | 1400 |
| Last Chance, No. 2 | July 22, 1871 | H. Harvey | 800 |
| Detroit | Aug. 11, 1871 | J. A. Varnes | 1200 |
| Adelaide | Aug. 20, 1871 | J. Speer | 1200 |
| Reverend | Aug. 20, 1871 | R. F. Dewey | 1000 |
| Thomas Jefferson | Sept. 5, 1871 | W. A. Bayford | 1200 |
| Silver Shield | Sept. 6, 1871 | Wm. McKean | 1200 |
| Victoria Tunnel | Sept. 4, 1871 | J. Johnson | 600 |
| Jones and Padlock | Sept. 4, 1871 | S. A. Colburn | 1400 |
| Queen and Galscott | Sept. 7, 1871 | T. A. Jones | 1400 |
| Wells Fargo Tunnel | Sept. 17, 1871 | Henry Owen | 1400 |
| No. 1 Tunnel | Sept. 20, 1871 | F. Priest | — |
| Toledo | Oct. 1, 1871 | Alex. Majors | 1200 |
| Ida | Oct. 1, 1871 | J. M. Haskell | 1200 |
| First National | Oct. 26, 1871 | Wm. Moore | 1000 |
| Durango | Oct. 28, 1871 | T. B. Orny | 1400 |
| Cashier | Oct. 31, 1871 | J. A. Varnes | 1400 |
| Manhattan Tunnel | Nov. 10, 1871 | G. P. Dow, et al. | 1600 |
| Equitable Tunnel | Nov. 10, 1871 | J. C. Parker | 1200 |
| Little Giant | Dec. 29, 1871 | R. E. Thompson | — |
| Frederia | Dec. 29, 1871 | G. L. Howard | 1000 |
| Frederia Tunnel | Dec. 26, 1871 | C. H. Fry | 1400 |
| Edna Tunnel | March 25, 1872 | G. W. Arnett | — |
| Royal George | March 25, 1872 | W. H. Howland, et al. | — |
| Wahsatch Tunnel | March 27, 1872 | W. H. Howland, et al. | 1200 |
| Wyoming | April 25, 1872 | J. Donohoe | 2000 |
| Silver Vault Tunnel | April 25, 1872 | W. H. Howland, et al. | — |
| Lode Emma Tunnel | May 7, 1872 | James Wall, et al. | — |
| Lady Eden Tunnel | May 7, 1872 | J. M. Hartley, et al. | — |
| Brewer and Larham Tunnel | May 13, 1872 | C. J. Parker, et al. | — |
| Bay City Tunnel | May 25, 1872 | W. M. Brewer, et al. | — |
| Pacific Tunnel | May 25, 1872 | W. H. Ashton, et al. | — |
| Filmore Tunnel | May 25, 1872 | W. H. Ashton, et al. | — |
| Challenge | June 3, 1872 | A. M. Doughman, et al. | 1500 |
| Sacramento Tunnel | June 3, 1872 | L. U. Colbath | — |
| Black Mountain | June 5, 1872 | J. A. Varnes | 1200 |
| Tobias Tunnel | June 5, 1872 | D. F. Richards | — |
| Haskell | June 17, 1872 | J. M. Haskell | 1500 |
| Rollins | June 19, 1872 | J. W. Brewer | 1500 |
| Royal Tunnel | June 21, 1872 | J. M. Haskell | 1500 |
| Herrmann Tunnel | July 8, 1872 | C. C. Bradshaw | — |
| Amador | July 14, 1872 | C. C. Morse | — |
| Hero | July 18, 1872 | F. W. Hermann | 1500 |
| Maxwell Tunnel | July 24, 1872 | J. N. Hayes | 1500 |
| Oxford and Geneva Tunnel | Aug. 5, 1872 | H. Peirce | — |
| Wild Fishman Tunnel | Aug. 23, 1872 | N. M. Maxwell | — |
| Reed of Trade Tunnel | Aug. 19, 1872 | J. M. Kelly | — |
| Jacob Astor Tunnel | Aug. 27, 1872 | J. A. Varnes | — |
| West Point Tunnel | Sept. 7, 1872 | S. M. Dingham | — |
| Topoka Lode | Sept. 27, 1872 | D. C. McGlynn | 1500 |
| Henderson Tunnel | Sept. 27, 1872 | L. V. Winans | — |
| Tronion Lode | Oct. 7, 1872 | J. M. Henderson | 1500 |
| Rockford | Oct. 12, 1872 | J. W. Whitteit | 1500 |
| Windsor Tunnel | Oct. 12, 1872 | J. L. Hathaway | — |
| Gran Temple Tunnel | Dec. 3, 1872 | S. M. Dingham | — |
| Grassbrook Tunnel | Dec. 15, 1872 | T. B. Orny | 1500 |
| Modder Lode | Sept. 21, 1872 | L. Martes | 1500 |
| Conard | Oct. 9, 1872 | A. J. Fitzgerald | 1500 |
| Belmont | Oct. 12, 1872 | L. Martes | 1500 |
| Merchand | Oct. 31, 1872 | L. Martes | 1500 |
| Comstock | Dec. 18, 1872 | J. E. Winde | 1500 |
| Othello | April 7, 1873 | J. E. Winde | 1500 |

The foregoing table comprise the principal mines in Little Cottonwood, although there are many other promising properties which are worthy of mention, did space permit. And in concluding my

remarks upon this district, I may say it is one of the foremost in the Territory, and that its prospects for the future are very encouraging. All the mines that have been worked during the present season have produced very successful results; and, in fact, this is the mineral wealth of Utah is not a chimerical delusion, but a practical reality. And although the season has been a dull one, so far as changing as owners are concerned, yet to-day the mines of Utah are in a better condition and more valuable than they were two years ago. There has not been so much excitement, but more practical work has been accomplished, and mining has become more of a regular branch of industry than a mere medium for speculation, which it was formerly. But more of this in another letter, which will be upon Big Cottonwood District.

The Grizzly Mine was discovered in April, 1870, and located on unsurveyed lands of the United States. It is situated on the east side of Emma Hill, on a high divide between Little and Big Cottonwood Canyons, at an elevation of more than 8000 feet above sea level. This mine is well developed, and the improvements consist of the following works—a discovery shaft with side drifts and inclines, an open level, an upper level drift, and an open level, all of which improvements are partially timbered, and partially self-sustained by well-defined walls of limestone and quartzite formation. The average width of the mineral vein is from 6 to 6 1/2 feet slightly to the north-west, and is composed of gray and black carbonates of galena, mixed with yellow ochre, bearing silver. The average assay of the ore is about \$70 per ton in silver, and 45 per cent. of lead. This mine contains 3000 by 100 feet, and has been surveyed for United States patent.

The Vallejo Mine is situated on Emma Hill, and was located early as 1868, but has only been worked for the past two years. The improvements consist of a discovery shaft, a tunnel that cuts the vein about 200 feet below the surface, and several open cuts on levels. The claim consists of 2000 by 100 feet, and the appearance of the vein improves steadily as developments are prosecuted. The ores average in quantities 40 ozs. of silver per ton, and 50 per cent. in lead. In connection with this mine is a tramway, which costs nearly \$15,000. This property gives every promise of becoming a very valuable mine.

The Davenport mining claim was located in June, 1870, and is situated across the dividing ridge between Big and Little Cottonwood Canyons. It contains 1800 by 100 feet, and has been continually worked since its discovery. The developments consist of several shafts, inclines and drifts, and a tunnel 600 ft. long, which improvements are said to have cost about \$50,000. The lode consists of deposits of carbonate ores, the vein averaging about 5 ft. in width. About 1400 tons of this ore has been worked by smelting, and yields an average of \$150 per ton in silver. There is a steam saw-mill attached to the property, and timber is abundant in the vicinity, so there is a good wagon-road to within a short distance of the mine.

The Matilda mining claim was located July 3, 1871, and is situated near the Davenport Mine, which it crosses at one corner. The developments are a discovery shaft, and several hundred feet of drift along the vein in a north-easterly and south-westerly direction. The lode consists of 1000 by 100 feet, and contains a valuable deposit of carbonate ores, similar to those found in the Davenport, and of about the same assay value. The vein is nearly vertical, and varies in width from 4 to 20 feet. It is claimed that the improvements on this mine cost over \$10,000. It and the Davenport have both been surveyed for U.S. patent, and form the Davenport and Matilda Consolidation. The property was purchased for a large sum in the fall of 1872, by some Salt Lake City capitalists, who have every faith in its future. The Wellington Mine is situated on the summit of the divide between Little Cottonwood and American Fork Canyons, and was located in July, 1870. It contains 1000 by 100 feet, and consists of large bodies of galena and carbonate ores, the average assay value of which is \$80 in silver per ton, and 50 per cent. of lead. The vein is well defined, and averages from 20 to 30 feet in width. In connection with this mine is the Wellington furnace, which has a capacity of 20 tons per day.

The Lexington Mine is situated on Lexington Hill, and was located in October, 1871. It contains 3000 by 100 feet, and is one of the most promising mines in Little Cottonwood. The mine is developed by two shafts, and several open cuts and levels. The ores are principally carbonates, assaying in value about 60 ozs. in silver per ton, and a small percentage of lead.

The Lady Moorhead Mine was located in June, 1872, and is situated across the divide between Little and Big Cottonwood Canyons, in close proximity to the Flagstaff Mine. It contains 1500 by 1000, and so far as developed the vein seems regular and vertical, being a new location, comparatively little work has yet been done on it. There is no mill on the property, but plenty of excellent timber is to be found in the vicinity. This mine has been surveyed for U.S. patent.

The Enterprise Mine was discovered July 24, 1870, and recorded Aug. 28 of the same year. It is situated on Emma Hill, about half a mile north-west of Alta City, at about 8000 feet above sea level. This mine has a regular fissure vein, averaging about 3 ft. in width, which dips to the north at an angle of about 80°, between well-defined walls of limestone formation. The mine is well developed by various shafts and levels, the value of which is estimated at more than \$10,000. It contains 1400 by 200 ft., and is composed of large deposits of carbonate and galena ores, with some sulphates, averaging in assay value about \$100 in silver per ton, and 45 per cent. of lead. An abundance of timber for the future development of the mine is found in the immediate vicinity. There are excellent facilities for shipping the ore, as the mine is only about 500 ft. distant from the main road, and 1500 ft. below the summit, or divide, between Little and Big Cottonwood Canyons. This lode has been surveyed for United States patent.

The Alice mining claim is situated on Emma Hill, about a mile distant from Alta, and was one of the locations of the old Matilda Lake district. It lies at an altitude of 9500 ft. above sea level, and the discovery shaft bears south 55°, west 227 ft. from the discovery monument of the Matilda Mine. It contains 2400 by 200 ft., and consists of carbonates of lead and silver, assaying \$100 per ton in silver, and 40 per cent. in lead. This mine has been surveyed for United States patent.

The Excelsior Lode was discovered in June, 1870, and is situated on Emma Hill, near the divide between Big and Little Cottonwood Canyons, 9500 ft. above sea level. The ore is composed of carbonates of lead and silver, assaying about \$80 per ton in silver, and 45 per cent. of lead. This mine contains 800 by 100 ft., and has been surveyed for United States patent.

The Imperial mining claim was discovered in June, 1871, and is also situated on Emma Hill, near the divide between Big and Little Cottonwood Canyons. The mineral vein is well defined, and consists of ores composed of carbonates and oxides of lead carrying silver, which assays about \$70 in silver per ton, and 40 per cent. in lead. This lode contains 1200 by 100 ft., and has been surveyed for United States patent.

The Fuller Lode was located in June, 1871, and is situated on the southerly slope of the Toledo Hill. The developments consist of two shafts, the main incline shaft being more than 200 ft. deep. At the bottom of this shaft is a cave, the dimensions of which are not yet fully known. In this cave there are immense quantities of ore, the ledge being visible for 50 ft. in height, showing an average width of 3 ft. The formation is quartzite, and there is every indication of the vein being a true fissure vein.

The Relief Lode was located October, 1871, and is situated on the southern slope of Frederick Hill. It contains 1000 by 100 ft., and the ores are principally argentiferous galena.

The Toledo Mine was located in October, 1871, and is situated on Toledo Hill, 75 ft. above the Fuller Lode. It is developed by a shaft 90 ft. in depth, following ore all the way. The vein runs parallel with that of the Fuller, and averages about 4 ft. in width. The mine contains 1200 x 100 ft., and is principally composed of low-grade ores. These last three mines have been incorporated, and are owned by the Toledo Utah Silver Mining and Smelting Company of Toledo, Ohio. The managers of the property have been working it very quietly all the summer, and the results have been very satisfactory. The mine

are well timbered, all the buildings are neat and substantial, and the property has now a reputation equal to any in the district. The King of the West mining claim was located in September, 1870, and is situated on the east end of Emma Hill, at an elevation of 9500 feet above sea level. The improvements consist of a discovery perpendicular shaft, and also an incline shaft, both of which are constantly extended as developments, are prosecuted. The mineral vein extends about 3 ft. in width, and consists of carbonates, mixed with yellow ochre, averaging in assay \$40 in silver per ton, with a small percentage of lead and copper. This mine has been surveyed for United States patent.

The Stoker Mine was located in June, 1870, and is situated on the upper mineral belt of Emma Hill. It is developed by an incline shaft 200 ft. deep, and the footwall is so well defined, that the vein is not lost at any place in the shaft. The vein averages from 2 to 5 feet in width, and is composed of very high-grade ores. This mine contains 1200+100 feet.

The Darlington Mine was located June, 1870, and is situated on Emma Hill, about 9500 ft. above the level of the sea. The improvements are well developed, and consist of several shafts, inclines, and open cuts, also a tunnel, which is more than 1000 ft. in length. The mineral vein is now well defined in limestone formation, averaging about 24 ft. in width. The ores are principally carbonates, and average by different assays about \$60 in silver per ton, and 25 per cent. in lead. This claim contains 1400+100 ft., and has been surveyed for United States patent.

Following is a complete list of all the mines in Little Cottonwood district that have been surveyed for United States patent:—Emma, Last Chance, Flagstaff, Hiawatha, Lavinia, Grizzley, King of the West, Darlington, Davenport, Alice, Matilda, Enterprise, Lady Moorhead, Excelsior, Imperial, and Caledonia.

B. A. M. FROST, United States Surveyor.
Salt Lake City, Sept. 30.

MINING IN UTAH—THE TECOMA.

SIR,—I am annoyed at seeing the nonsense published regarding the Tecoma Mines, and such trash as cypher telegrams to purchase the same. If the parties interested wish to be in possession of good and reliable news they should send a man here who will post them in mining matters. There is no mine in Tecoma worth a haubee, Forbes will tell them so if they ask him. What ore that is being worked at Tecoma is from Battle Mountain, and not from Tecoma. It will not make a mine out of nothing; he may obtain ore, but it only lasts a short time.

JAMES DUNCAN,
of McKee and Duncan, Merchants, Bingham, Utah.
Bingham Canyon, Oct. 2.

MINING RESOURCES OF CHILI.

THE REGENERATIVE (DOUGLASS AND HUNT'S) PROCESS OF EXTRACTING COPPER FROM ITS ORES.

SIR,—This method, which can be adopted at any mine, is applicable to all classes of copper ores, whether they contain sulphur or not. The only difference consists in the fact that ores containing sulphur must be calcined first. Even native copper, if it is present only in minute quantities, will be found to be dissolved. This method offers the following advantages over all others that have been proposed by the wet process.

1.—In its application no acid or salt is used to dissolve the copper. In the ordinary wet processes the oxidized copper is dissolved in hydrochloric or sulphuric acid, or the ore is calcined with 2 or 3 tons of salt to each ton of copper. In this method (Douglass and Hunt's) the solvent employed is the protochloride of iron (neutral), which is continually regenerated by the act of precipitation, with only a very trifling loss.

2.—Less than half the quantity of metallic iron is required to precipitate the copper than is necessary in acidulated solutions.

3.—The only operation in which fuel is used is in the calcination of the metals, and only a very small quantity of this. So that this method is applicable, with great advantage, to those places of the globe where the low ley of the ores, or the high price of fuel, would render smelting impossible or unprofitable. The ley of the copper which is obtained by this process being about 90 per cent., the cost of reducing it to bar copper is almost insignificant.

DETAILS OF THE OPERATIONS.—1. *Grinding the Ores.*—The character of the base of the mineral determines the extent to which the grinding must be carried. If, for example, the specks of metal are very finely distributed in an impermeable base, it is evident we must grind them as fine as possible, because if the ore is a sulphureous one, the above-mentioned specks of metal can be thus calcined perfectly, and also be exposed with facility to the action of the chloride of iron in the dissolving bath. But if the copper in the ore is of considerable quantity and size, the calcination does not require such an extreme grade of fineness to become effective. We must, however, bear in mind that if we do not grind the ores sufficiently fine our consumption of fuel during calcination will be considerably greater. In other words, the consumption of fuel is in inverse ratio to the coarseness of the powder to be calcined. With regard to ores found in Chili, we may observe that sulphurets extracted from veins, or veins, ought to be passed through a sieve of 8 to 12 holes to the inch, while those extracted from *montes*, or lumps, ought to be ground finer still. To grind the ore to the first state it is best to use cylinders, and for the last state of pulverisation stamps will be found the most economical. A pair of 24-in. cylinders ought to grind 1 ton of ore in the hour, with a power of six horses, and each stamp ought to powder about 24 quintals in one hour, supposing that the ore has been previously ground up in an ordinary Blake's crusher. Each stamp generally requires 1-horse power. Speaking generally, we may state that carbonates do not require the same degree of fineness as sulphurets.

2. *Calcining.*—As I have already said, we must calcine the sulphurets, an operation which, when they have been pulverised, can be done at the rate of 200 quintals in 24 hours. If the metal is in coarse powder it is better to use a mechanical furnace, but whether the metal is coarse or fine, we can use the ordinary reverberating furnace, taking care to keep up a low heat, and to frequently stir up the charge. In the case of certain classes of ore very rich in sulphur, calcining in heaps in the open air beforehand is very advantageous, inasmuch as this operation facilitates in a very high degree its subsequent complete pulverisation, and also considerably diminishes the cost of calcining in the furnace. The object of this calcining is to convert the sulphurets of copper into oxides and sulphates: the very last trace of sulphur will disappear if the operation be conducted with care, and in this case the copper will be completely extracted in the subsequent operations. Such an exact result is very difficult to obtain unless with skilled workmen. However, without very great expenditure of coal, and with ordinary care, not more than 4, or at most 1, per cent. will be lost, which will be afterwards arrested in the re-washings.

3. *The Solution.*—The solvent used is the protochloride neutral of iron. This can be manufactured by mixing common salt and sulphate of iron in certain proportions. By dissolving metallic iron rich in sulphur a considerable portion of copper is converted into sulphate, which is soluble in water; now, if for every 60 lb. of copper dissolved in this manner there are added 120 lb. of common salt, and the liquid treated with metallic iron, the copper will be precipitated, and there will be formed in the solution such a quantity of protochloride of iron, that it will be only necessary to add 200 lb. more of common salt, and sufficient water to form a bath of 100 gallons of the required strength. This solvent can be applied to all oxidised metals, whether they are subsequently placed in the filtering baths, or whether, through containing exceedingly finely divided mineral, they are treated with an "agitator."

It often happens that the coarse powder (*granza*) of the carbonates are very friable. It is better in this case to separate the coarse powder from the fine, which always contains, and indeed constitutes, the friability: after this separation has been effected the coarse is worked by the filtering method, and the fine in a bath by means of an "agitator."

These baths may be of wood or of brick. A convenient size for wooden baths is 12 ft. in diameter and 3 or 4 ft. in depth: 3-inch

American pine answers well for this purpose, with iron bands of 3 by 3-8th inches.

The filter can be made in various methods. We may place in the bottom of the bath a layer of stones 3 in. thick, or ashes, or clean coke, with a covering on top of sand. Or we may make the filter with a false bottom, with holes in it, protected by common sacks. The metal is placed on the top of the filter, to the thickness of 1 or 2 ft., according to its fineness of division. In case we use brick tanks, the bricks must be of a close texture, well fastened with good Roman cement, and faced with the same material.

The liquid will run out by a hole placed at the bottom of the bath or tank, which must be always kept covered up, to prevent loss of heat. It is advantageous to dump the mineral before throwing it into the bath, as this promotes the uniform percolation of the solution. We must be careful to prevent the formation of a depression in the bed of the metal, and take care that there always remains 3 or 4 in. of liquid on top. To obtain this result it will be sufficient to go on replacing with fresh liquid that which runs out at the bottom of the bath. When the liquid which flows out at the bottom only contains copper in a minute proportion, the exhausted bath is washed to extract the salt solution. This water serves over and over again to replace the iron and salt which were lost in the original bath—in other words, to regenerate the bath: 24 hours are sufficient for the extraction of copper from ores of 5 per cent., always supposing that the solution is of sufficient strength, and the bath is maintained at a temperature of 50° centigrade.

In a bath of the above-mentioned capacity, with an "agitator," four or five hours are sufficient to dissolve the copper contained in 5 tons of 5 per cent. metal, inasmuch as the "agitator" effects the extraction very much quicker than filtration only.

The solution of the chloride of iron works upon the oxides of copper, converting them partly into protochlorides and partly into dichlorides of copper, giving room, at the same time, for the formation of peroxide of iron, and a very small quantity of oxichloride. When the copper is obtained by filtration only, by excluding the air as much as possible, the production of sub-chloride of copper is augmented, and that of oxichloride of iron diminished, and a very notable saving of iron is obtained in the precipitation of the copper.

In the subsequent precipitation the chloride of iron is returned to the bath with a very small loss. The chlorate lost in the basic oxichloride, and that which is lost in the re-washings, when this latter operation is imperfectly done, is so small that 1 quintal of salt is sufficient to replace the loss in 1 ton of copper. This loss can be greatly lessened, and, indeed, the loss of iron entirely avoided, by passing a current of sulphurous acid from the calcining furnace over the top of the bath in the "agitation" baths, or in the ordinary filtering ones.

When working upon metals that form sulphate of copper in their calcination no loss of iron is experienced; it even may happen that an excess of iron accumulates in the bath, which can be separated from time to time by mixing small quantities of chalk with the calcined metal. In the working of carbonates a small loss of chlorate of iron is inevitable. To avoid this it is recommended that a small quantity of sulphurets be added to them, because the sulphate formed during the calcination of 1 ton of yellow sulphurets will replace the loss caused by the treatment of some number of tons of carbonates.

Precipitation.—The fluid, charged with copper, which runs out of the baths falls into a vessel, which has the form of a large rectangle, and the bottom of which is filled with pieces of iron. It has longitudinal divisions, like canals, which compel the fluid to run over a considerable space of ground. The copper solution goes in at one end, and after having run through all the divisions, at the bottom of which it comes in contact with the iron, is drawn off at the other end by means of a pump, and returned to the original bath, the chloride of iron in the bath being regenerated at the expense of the metallic iron consumed in the precipitation.

Materials such as pails, pumps, pipes, &c., ought to be of wood: connecting tubes, whether for the conducting of steam or for the distribution of fluids from bath to bath, ought to be of gutta percha, inasmuch as the greater part of the common metals and their alloys are attacked by a liquid charged with chloride of copper.

METHOD OF WORKING METALS CONTAINING GOLD AND SILVER BY THE SAME PROCESS.—The bath of proto-chloride of iron and salt, after being more or less completely saturated with copper, will dissolve chloridised silver, or any of its compounds, by virtue of the well-known action of protochloride of copper. Repeated experiments have proved that metals of sulphur containing gold and silver in Colorado, United States, and Chili, when duly calcined, leave all the silver contents dissolved in the bath in the shape of chloride, which can be precipitated in the metallic state, by treating it with metallic copper, or passing it through copper cement. After the silver has been thus passed the copper is precipitated, as usual, by metallic iron. The residue of the bath, after it has thus lost both its silver and its copper, contains all the gold in a state favourable for its removal. The same method is also applicable to copper and silver regulus. Experiments on a large scale have proved that a regulus containing at the same time gold, copper, and silver can be treated by the present system for the extraction of pure copper, with a very trifling additional cost for the extraction of the gold and silver. To remove the silver we need only make use of a portion of the copper cement obtained by a previous operation, and for the removal of the gold we can use either the method of chloridisation or of amalgamation.

This method has been tried extensively at Tiltit, and also near Coquimbo, but has hitherto signally failed. A great difficulty was experienced at first in getting the tubs to stand, but after this difficulty was got over the "bath would not regenerate." A great deal of money was sunk at Tiltit, and no adequate results followed. The process may, then, be condemned practically, though glowing with 25 per cent. profits theoretically.

OLIVER NORTH.

AMERICAN MINING.

SIR,—It appears now to be pretty well understood by a large number of your readers that the deplorable disasters which have befallen so many English adventures in American mines have resulted more from the manner in which they have been floated and worked than from the non-productiveness of the mines themselves. As a resident of Nevada at the time the mania was prevailing, I may possibly be able to form a more correct judgment of the causes which operated to bring about such unprecedentedly deplorable results than those who have never visited, and, consequently, know nothing personally of the nature of things in that part of the country. The enterprising English adventurers, unquestionably, had no doubt but that the precautionary measures adopted by them to secure their success were sufficiently good and reliable, and that the men employed to carry such measures into effect were beyond suspicion of doing knowingly a wrong act. But it would almost seem now that the social order and position of English gentlemen of even education, wealth, and pedigree are not to be relied upon in cases where the temptation to speculate is unusually strong. There may not have been a set purpose to do wrong, but that there has been a manifest weakness in yielding to wrong doing, and for purposes of personal pecuniary advantages, must, I think, be admitted. One or the other of these positions must be accepted. If a series of designed wrong doing has not been perpetrated by the representatives of English capital than the grossest ignorance has been displayed.

It occurs to me that it was the romantic halo which was thrown around the mines that were offered to the British public as unlimited channels of extraordinary productiveness, and the fabulous prices at which the fictitious-prepared articles were presented, that turned the heads of so many of those engaged to ascertain and determine the *bona fides* and real value of mining claims—in too many instances mis-called mines—or only properly so called in the widest and most latitudinarian sense of that term. The programme had, in my estimation, the appearance of an experiment, and novelty was resorted to in order to succeed. The American speculator soon found—it would appear—on coming into contact with the English, or the representations of English capital, that their proverbial caution was a myth, and that if it had ever existed had now departed, and

"like the baseless fabric of a vision left not a trace behind." He also perceived that almost everything pertaining to the real phrases of legitimate mining enterprises which could be had recourse to to stimulate investment had become too trite, uninteresting, and powerless to induce tardy capitalists to embark in ordinary adventures, and that it was only by introducing something truly startling—something beyond the pale of men's past experiences—that success could be at all looked for with any degree of confidence; and as the ordinary American temperament partakes of and is usually highly elevated by enthusiasm, no people could be better qualified to make an experiment upon such a scale than they. I do not think they would deem it derogatory—at least that portion of them inhabiting the west of the Rocky Mountains—if I should say that they usually evince as much strenuous enthusiasm in the maintenance of an assumed position as they do, or could do, for one ocularily or logically demonstrable. It would have been absolutely futile to attempt such an experiment without an elaborately devised plan, and one well fortified at all points, so that all questions, however pertinent or pointed, might be readily answered, and disposed of to the satisfaction of the interrogators. The symmetrical proportions and general harmony of the mechanical arrangements of these schemes were, indeed, most admirable to the eye of even cool and disinterested spectators, whilst the facilities for turning out *silver bricks* with rapidity, and on an apparently large scale, was really most surprising and captivating. It would not be out of place to say here that something akin to formality, if not of system, is expected to precede practical or experimental purposes of every kind in the United States—a sort of preamble by way of introduction or theoretic outline of purpose, plan, and the apprehended results. Men fresh from European countries, whose practical experience had long since transcended the theoretic formula of amateurs, are sometimes coarsely interrogated by the veriest tyro in the line with—"What is your theory?"

It is most surprising that English capitalists should have been so easily betrayed into giving their American cousins credit for such unbounded generosity in the matter of mines. Surely some suspicion should have been awakened, and especially in respect of those mines of such extraordinary pretensions, for mines which were capable of paying such enormous profits were most assuredly not in need of foreign assistance to develop them, and no one ought to have believed that if there was a probability of a continuation of such profits as were pronounced upon that there would have been any desire on the part of the Americans—who proverbially like big things—to transfer anything which would bear the stamp of *par excellence* to foreign capitalists for anything like a fair mercantile consideration, unless there arose some special and very forcible reasons for doing so. No one that knows how vain the ordinary American is in this respect would for a moment entertain such a presumption. Whilst, in respect of those mines which avowedly required capital for their further development and to provide the necessary machinery to that end, and to make available their products. The risk of finding the required capital for these purposes should be all that incoming parties should be invited to incur, and the originals should depend for their remuneration upon the natural resources and success of the enterprise, according as they themselves have predicated and represented by way of inducement to others.

If mines are undeveloped there is a risk attaching to any outlay which may be applied to their development, no matter how forcibly convincing and morally assuring the prospects may be, and all expenditure to that end is speculative, and made with the view of improving the property, rendering available its resources, and demonstrating its value, when, if full success attends the enterprise, the persevering and confiding adventurers are always satisfactorily, and sometimes handsomely, remunerated for their perseverance and outlay. But if the reverse of success should be met with it occasions them serious loss, independently of any sums which might imprudently be expended in the purchase.

It is not a fair and equitable mode of business for one party to a transaction to realise largely—nor, indeed, at all—at the expense of the other for anything which can only be made intrinsically, or even commercially, valuable at the expense of the latter, especially when, as is so frequently the case in mining, the desired success can only be predicated from certain symbolisations, which depend for even their approximately correct interpretation upon the analogies of experience, both scientific and practical.

ROBERT KNAPP.

London, Oct. 22.

MINING IN NORTH WALES, AND ITS PROSPECTS.

SIR,—Allow me to divest this of wordy circumstance, and ask Mr. Knapp to come to the point in question. In my letter of Sept. 23 I stated that I gleaned a little knowledge of geology during the last 37 years, which is perfectly correct; but Mr. Knapp insinuates that I have devoted 37 years to study the geology of the district, and in another place he makes me a professed geologist of 37 years standing; all these additional records I can well bear, and thank him for his compliments. Mr. Knapp says I have insinuated something rather ugly as to the correctness of his reports of the mine. I solemnly declare I never read a single report of his, and no remark of mine could possibly refer to anything in that direction; so far, everything I have written bears upon his letter of Aug. 16. Mr. Knapp says there is a clique: if there is I know nothing at all about it. Mr. Knapp says "there ought not to be anything personal in the discussion of scientific subjects, but we ought to have in view mutual edification and improvement." I say he is quite correct, and this is what I had in view when I respectfully asked him to name the places where the granite and fossils are to be found. I do not know him personally, and I can assure him that I will not dishonestly advance towards him; I am sensible that this is a purely scientific question, and one that he ought to be proud to be able to throw additional light upon. I ask him, and that with all the seriousness the subject demands, to name the places. With regard to my name, what has that to do with an important point in science? Surely you will not keep back the secret because I do not give you my name in full; let every name be dropped, and let no hindrance stand in the way. I know it is an awful responsibility to stand in the way of advancing science, and I cannot see the reasonableness of depriving others of this important knowledge, if I, in language too boldly, asked Mr. Knapp to reveal the secret. I wish Mr. Knapp every success in mining, and indeed, every one connected with mines near him. Some other time, perhaps, it will be fair to name those most prominent of the shallow-mining ventures in the locality to which Mr. Knapp alludes in his letter of Aug. 16, a list by no means unworthy of mining engineering.

CYMRU.

TREGOTHAN UNITED MINES.

SIR,—Partly in the parish of Kenwyn, and partly in that of Kea, Cornwall, is situated (in the Chacewater valley) a valuable piece of mineral ground, which was formerly called Wheal Prosper, but, for the sake of distinction (there being several mines of that name) it has lately been designated "Tregothan United Mines." It is a very remarkable sett from the great number of the lodes it contains, there being no less than 13 within the northern and southern limits of the sett—lodes usually called "east and west lodes." There is also, in or about the centre of the sett, a very wide elvan course having the same bearing, and on the western side there is a cross-course intersecting all the lodes at nearly right angles. From these mineral characteristics it will naturally be inferred by all Cornish miners—in fact, by all metallic miners—that the sett may be called "kindly." Not merely so; it is productive already of both tin and blende, some parcels of the latter ore being on the "floor" ready for sale, if not already sold. [My visit there was ten days ago.] Of the 13 lodes one yields blende, one is a copper lode, and all the remainder are tin lodes, most of them merely "cut" in the adit, but from several of them tin was raised many years ago, and copper from the copper lode. From information derived from an intelligent miner, who met me on the spot, and who is intimate with the mine and its surroundings, I am impressed with the conviction that the mine presents a good field for mining operations, with prospects of dividends at no remote period from the time that sufficient force is applied to the process of development. A small capital, it is believed, would be sufficient to bring about profitable results. The mine is

already self-supporting from the returns of blende and mundie alone. The position of the sett in relation to mines of celebrity is eligible, having for neighbours the celebrated Gwennap Consolidated Mines on the south, which yielded 600,000l. profits to Messrs. Taylor and Co.; Creigbrows and Wheel Unity at the west, the former working 300 years, and the latter having left a profit of 350,000l.; and Great Wheel Bay at the north, which anciently yielded large profits, and probably will again. Tregothnan United Mines may fairly be said to stand in the heart of a great, rich mineral district, unequalled in yield of mineral wealth, except by that of Camborne and Illogan, which is one of the best, if not the best, as yet known in the world. A few men and women are at work here under the management of Capt. John Mayne, the intelligent manager and chief proprietor of West Gorland, near St. Day, who is fortunate in that mine, and is likely to be fortunate in this. I wish him and all other honest men success in their undertakings.

It is to be hoped that a spirited working of Tregothnan United will furnish employment upon a large scale to the men thrown out of work by the abandonment of the mines around Chacewater.

Truro, Oct. 22.

R. SYMONS.

FORTESCUE MINE, ST. STEPHENS, CORNWALL.

Sir,—I took the opportunity on Friday last to make a call at Fortescue Mine, just to see how the works progress. I found about 7 or 8 (estimated) tons of tin ore waiting the completion of the calciner, which is nearly ready. The agent said that that quantity of "black" tin will be ready for the smelting-house late in November, and that about the same quantity, or more, will be saleable monthly, without any increase to the stamping power; but I understand that the company intend to increase the number of stamp-heads, so that there will be a larger return than that named monthly. A good deal of time and expense have been necessarily consumed in the preliminary work for dressing, &c., in a new mine. Everything had to be laid out. I was told that the average produce of the tin-stone was 25 lbs. tin to a ton of stuff, which appears a good proportion compared with many other mines. It is very cheering to have a good mine or two in the St. Stephen's district. If Fortescue turns out according to well-founded hopes it will stimulate mining in that neighbourhood, which will be a boon to the labouring class.

Truro, Oct. 22.

R. SYMONS.

MINERS' CONVERSATIONS—No. I.

Sir,—You are apprised of the fact that many of the Cornish miners are very intelligent with respect to persons and things with which they are associated or connected. The following overheard conversation will show the opinion held by miners of some of the chief mine agents in the Redruth and Camborne district, and on other matters. On an evening a few weeks ago I had occasion to stop at an inn in Redruth overnight. Sitting quietly down in the corner of a room in which two miners were indulging in their too-much-prized bottle, I was amused at their freedom of speech; and as I did not shut my ears, and was awake, I could but hear what they said in audible tones. The following may be taken as a tolerably correct report (substantially) from memory, of their conversation:—

John—Where do you work, Bill?

Bill—In Dolcoath. I have worked there now more than three years, and I don't know that I can benefit myself much by leaving. The only thing I dislike is the great depth I have to go down. I would rather work nearer the surface.

John—But you have a man-engine to let you down.

Bill—Yes; but I would rather work in a shallow mine.

John—How much are you allowed to get per month?

Bill—I have been working on tribute for a good while; on the average I have "fanged" [a miner's term for earned] about 4l. per month.

John—How do you like the captains?

Bill—The captains are as good, I believe, as you will find in any mine, allowing for some weaknesses common to men. Capt. Josiah Thomas, our field marshal, if I may so call him, is a very kind-hearted man—he is what we call a "live and let live" man. One thing you may be sure of receiving from him, which I cannot say of some agents I know—you have civility, without any taint of pride or superciliousness, which abound in a good many upstart captains. He is much of the temper of his good father, who was so beloved all through a long life. He stepped into his "father's shoes," as people say. Captain Charles acted very wisely in getting him made joint manager with himself; for he calculated that upon his decease Capt. Josiah would be made sole manager under the committee, and so it turned out, but he was never a working miner. Capt. Tonkin I call No. 2, but Capt. Provis thinks himself next to Capt. Josiah, although we men do not think that he knows half so much as Capt. Tonkin about lodes and mine management. Capt. Provis, I believe, has been there longer than Capt. Tonkin, and that, I suppose, is Provis's ground for claiming precedence.

John—You mentioned a committee; can you tell me what good a committee is in a mine where an able man—such as Capt. Thomas—is at the helm?

Bill—It must be a more clever man than I am to find out the good that a committee does in a mine. A committee is appointed for its own good, not for that of the mine. A committee in a mine under Cornish control consists in general of merchants, or their friends, who wish to arrange that the supplies shall come from them. I contend that the manager—so called—should be empowered to obtain the supplies from the cheapest market, and to sell the produce in the dearest. In the consolidated mines, in Gwennap, when I worked there, many years ago, Capt. John Richards advertised for tenders for supplies, and that is a mode that should be more generally adopted in large mines—such as Dolcoath, Tincroft, and Carn Brea.

John—You mentioned Tincroft and Carn Brea, where Capt. Teague is manager; what do you think of him?

Bill—I think him a very clever miner, and endowed with much forethought, for otherwise he would not have succeeded so well, as it is well known he has done, in amassing wealth. A few years ago—say 20 years—he was a miner like you and I at Wheal Bassett, and he is not ashamed to admit it, and I like him for that. A man must be proud and foolish to be ashamed of any honest occupation, even that of a scavenger. Mr. F. Pryor employed him first as an agent (upon the recommendation of Capt. Joseph Vivian) at Pollice. From Pollice he was removed by Mr. Pryor to Tincroft, where he managed to purchase a large interest on easy terms, and where he quickly made a fortune out of profits. He is now a landowner, having several large estates, and I dare say has a very large balance at his bankers, besides all his shares in mines, which are very valuable, but not so valuable as they were a few months ago by, perhaps, 100,000l., owing to the present depression in mining property, consequent on the advance in the prices of materials and labour.

Bill—How is Capt. Teague liked?

John—Not very much; he is too overbearing, the very antipodes of Capt. J. Thomas. He pleased the men by adopting the four-week month, but so far as mines are concerned that will do no good. I heard that if a man offend Capt. Teague he will not only give him a discharge, but will order any member of his family (if any at work at his mines) to quit likewise. I cannot vouch for the truth of this statement; it may be false, and I hope it is for Capt. Teague's sake. People say that Capt. Teague is possessed of the philosopher's stone, which, it is said, turns everything it touches into gold. I am not quite convinced of the truth of that maxim. You know as well as I do that Capt. Teague never discovered a mine; but he knows how to take a fitting opportunity of entering into a mine opened by other people, such as Tincroft, Carn Brea, Wheal Kitty, and Seton.

Bill—He made it appear at the first meeting of Seton adventurers that a profit was earned, and so declared a dividend; but I have heard that all the costs were not charged up. As I have no interest in that or any mine except as a labourer, I do not take any pains to verify what I hear. I believe no one disputes his honesty or his ability to manage a mine well, but I question his policy in reducing the men's wages the other day, inducing them to run away.

John—Did you ever work under Capt. Joseph Vivian?

Bill—Yes; and I found him one of the best of miners, and one of the most reasonable men you can meet with. He is a man that would combine the interest of the employed and employer, doing

justice to all. I was working at North Roskear when he left that mine, because he did not suit the villainous brokers. I am glad that he has a good mine in South Condurrow, but I believe that owing to the change of times his other mines are poor, and poverty at present is connected with most mines. The price of coal is awful, owing to the strikes and the avarice of the coal-owners, who made the strikes a pretext for charging the present exorbitant prices. I fear that we shall never have coals again at the old prices.

John—The colliers have acted most unreasonably, and I suppose by-and-bye they will have to repent of their folly and bad conduct, when men from other districts supersede their labour, as they are now doing.—St. Just, Oct. 18.

AGENT.

PRACTICAL MINING—SUGGESTIONS TO AGENTS—No. 1.

Sir,—I may first ask why do men with small capital invest in mines? Is it not with a view generally to aid them to bring up their families? I take that to be their view when they commence, but I am bound to say openly that not one mine out of five ever pays back principal and interest under the present system of working. Those who speculate in mining with a view to profiting from it should first convince the mine captains that they must work their mines under a new system, and one that is agreeable to and will keep pace with the age they live in, otherwise the shareholders will get no real dividends. They must bear in mind the extravagantly high wages, and the price of coals and materials now to be paid to carry on a mine. I do not complain as to the low price of the ore; it is quite high enough to keep up a good consumption of ores. I notice Mr. Treddinick has recently made some valuable remarks on what mines should be worked, and what should be left for a future generation. He has even gone so far as to name a great many mines that should have been abandoned many years since. He might have named more, but he made a fair start, and opened the way; and I am open to second him in his views. He, like most others, is not infallible, but he has left the door open for any man to prove that the mines he named have been stuck like a linnet to a rock. For between some 20 or 30 years they drawn from 50,000l. to 100,000l. from needy men's pockets—mines that a honest and thoughtful captain would have abandoned after spending 10,000l. I have ever contended that the crying evil against Cornish and Devon, and more particularly Welsh, mines is working over half that never stood a single chance of remunerating the needy man, who is ever ready to try his fortune with a hope to better his condition in life. These are by many supposed to be the very foremost and best men that enter the mining field. In my recent round in town many men accosted me in a spiteful plight, by asking—"Can you tell us what mine to speculate in with a chance to get back our money and interest for the same?" They admit that through losses they are crippled men. When I, very naturally, asked them where they speculated, I am not surprised at their having a losing game. I am not alluding to the captains who selected such sets to hand to the brokers, strengthened by a list of once productive mines, some of which, I may fairly say, are not within 20 miles of the sett they offer. I venture openly to say over half these men's money was spent on lodes that the subscriber never had a shade of a chance to get back 1d. in 1s. from. I now, and ever did, contend that it is the mine captains who are the great crying evil of Cornish and Devon mining. I have had to survey over 20 mines of late for parties who wish to speculate, if they could only have a fair chance for their money. Some 20 bal sellers have applied to me to come and look at the mines they have for sale, or want parties to join them in working. One would have expected after such applications to have found shafts and lodes laid open; but, to my surprise, I found some large sets with not a pit on them, and others with not more than one or two on them, and these half full of water, with a barrow or two of poor looking stones on top of the surface—no warrant of them ever being taken from the pits. Then they at once begin to point out that it is on some rich lode, or on some other mine's lode that had once a good lode in it. I think very little of any lodes that have paid well out of their own grounds. Let any practical man carefully examine any once paying mine, and he will find in that mine the why and the wherefore. Before he has half examined it he will be convinced it was produced on or near some intersection from lodes, elvan, and change of strata. I challenge any man that he shall not find a single paying mine in the country without it. He may at times find a lode productive out of the intersection, but it is not out of the influence of its effect on the lode. I prefer a parallel lode that meets the same intersection. A good practical man should never care about naming a once good lode anywhere; he has only to look to the district it is in, the nature of the rocks, and what intersection he can trace into it, what elvan does he know crosses his grant, what north and south lodes cross, what counter lodes they have, how many of them cross each other, are these lodes passing into different layers of rock, if he has plenty of these intersections within a fair distance, if they are in the granite? I say the tin-bearing layer; the slate on it is a copper-bearing layer; the second slate layer is a flint-alumina layer, which is the lead-bearing layer. Then, say your sett is half a mile square; then first open two cuttings nearly across, and find every lode, cross lode, and elvan in the grant, and every change of rock, if possible. Then commence a shaft at the very point where he can best meet the most intersection of point at the least possible cost. Then he has a true map before his eyes; he knows his business, he cannot well err. I do not say that all lodes are good at every intersection. Man has had a great deal to learn, even after he has found these places, as of two lodes meeting the same counter, and not 20 fms. apart, the one is producing and the other not. From 3° to 4° of bearing will do this, or one taking the dip of the rock first, will alter the next as to production.

I may ask any old tributor what Devon Consols had to do with the Prince of Wales Mine, or Gunnislake, or even Wheal Williams? I admit Wheal Williams is on or near the same line of lode west, and the ground much the same, but is not met by the same bearing of lodes and cross lodes. Then I may ask what has the tin in Kit Hill or Drake Walls to do with the tin they are looking for in Devon Consols? I argue that every practical mining man, who attempts to open up a new mine, should spend from 100l. to 200l. in two, or even more, cross trenches through his sett, and then lay down each true bearing on paper; then he will be armed with a true ground map or plan. I may be asked how many mines I have come across in my time that have been worked at random, with tens of thousands spent on holes cut and driven on for scores of fathoms, and then abandoned, until some future day or generation. When an elvan, or cross lode, is by chance discovered, running into this old abandoned sett, it is re-opened, and has since been a paying mine. While writing this letter a mine captain called on me. I asked how his mine was looking. He said, very well indeed. In driving the cross-cut they had met a lode they did not know of, with good copper in it. Here is a sett over a mile square, with, I may say, not a trial trench on it.

I believe mining men would do far better to take up a promising sett, such as they know to have many lodes running through, and cross trench it, as the outlay of 200l. would prove it, and show the effects where the intersection took place. Thousands of good intersections of lodes in Cornwall and Devon are yet undiscovered, and will turn up trumps on some future day. I would not take up new ground without taking advantage of these openings, which would be a sure guide to success. A few tinners and others would have a good speculation in doing this, as it is not the commencement of a mine on mere hearsay. I say to those inclined to venture, do not spend a shilling on any man's word, if he has not opened the mine by cross-cutting, and given ample proof that what he showed you on paper is borne out.

I quite agree with Mr. Treddinick, that one-half of the Cornish mines worked on a single lode, and old deep mines, must go before our mines can pay, or even give a fair chance of paying. I detest mines I see worked down even past the 100 fm. level, on old lodes, with out intersections. If they have not paid before this they have something wrong about them. Leave them for those captains whom I know never worked other lodes. Had they been wide awake they would have abandoned all such mines, and opened others within the same time and same money, and most likely found two or three good mines; as it is they will live, die, and go out of this world, and never find a paying mine, as hundreds have before them. I have myself

battled 60 years with this class of men, but now we have a new era come in. The agents must improve, or Cornish mining must collapse. The pipe or the glass will not support them. They are bound to come out. Some say the agents share with the squatters on the Red River. A certain man may, but that is no general support, for these mine captains must now learn how to keep Cornish mines on their legs, or the squatter and they will all die a natural death, and shortly.

I say mine adventurers have but one thing to do—that is, to get the right man in the right place. First ask him, when he comes to them with his first glowing report, "Have you cut a crossing to meet every intersecting layer and lode, cross, and elvan? Are the cuttings open for my inspection? Will you warrant your plan to be correct one? How many paying mines have you found through life? Name them. Will you pay my inspector's expenses to go and see your plan, and report if correct? Then ask the term of time to examine those questions they should not complain, after Capt. Knapperton to bear them all out. After this I hope to pass London streets with the majority of them will do or say anything rather than their work. I may give the public a few specimens of these men when they get sett, and if they can get in a few narrow-minded men they hang it for 5, 10, or 15 years, and seldom sink 20 fathoms. They have every week or two a report of something good likely to turn up, and some other party has cut a good lode, and it will ruin to turn up. These men will not draw the blood of the shareholder at once—put up a small engine, and try it in twelve months; it is not their object. They purpose an adit; they say they are in a beautiful mine-stratum, often cutting beautiful branches spotted with copper or lead, a sure sign that they shall cut a splendid lode when they get up to it. I surveyed one of these adits in Cornwall after one or two years' driving, when one unlucky night they holed out within a few fathoms from where they commenced, and the mine was abandoned. I knew another agent in a deep tin mine who wanted to sink a shaft under the bottom level, to say good tin was going down. To do this he put up a water-wheel, and turned down the water from the level above to drive it, and the engine had to haul the water up again. He then put men to work it as a tread-wheel. I know another of this class who put a large horizontal wheel on the River Tavy to work 1-inch rods, to drain a mine, when it would work either right or left, with no rodson. He then brought it on a shaft, and laid it horizontally for the same purpose, and I got iron tubes, like boiler flues, and placed them in a diagonal line to throw the water on the bucket side. I happened to be sent to see the result, but the agent and engineer had turned the water on the day previous to my going. They put in no appearance on the day I went. I need not say the mines were all wound up. I may say I have known an adit driven for years to cut a lode south inland, and hole to the North Sea. I have known an adit driving for years to unwater a lode, and when he did cut it they found no water. I have known and have had to do to mines to see what the captains were doing after 7 or 10 years' working, when they were only got down some 10 or 15 fms.

I know one man who worked a mine 11 years, always reporting he should pay dividends, and only got down 11 fathoms. I have others that worked mines for 7 or 10 years, and never got any machinery on the mine sufficient for the men to apply to Cart to take away their back wages. These men never do half work for the money, as they are for ever in doubt, expecting every month to be the last. The men often idle for days, running about in search of the so-called captain. He not to be found; he has often only two or four men on, when he keeps a squatter on the mine, paid a day workman, to keep him and the so-called captain informed as to what is doing. One man only is shown as captain on the books; it is seldom to be seen on the mine but when he happens to get money to pay the men, or rather subsidize them, as these miners are seldom paid up, and their working tools are seldom paid for in the year; were had. Those who venture in these classes of mines pay two wages, or wages for two captains; they have seldom four men on a mine for better men that venture with such should keep only one man and keep him on the mine. The deputy man costs the company more than a captain, as he is away half of his time in search for the captain, and has to be paid expenses in some way. I say openly that they are not the right captains in the right place; in fact, they are deserving no place, and the adventurers who will dabble with them and use such men only injure mining, and get a bad name for it. But the end is at hand; mining must shortly be regenerated; these men must shift to something else, or they must emigrate where they are not known.

In conclusion, I say three-fourths of the mines now working must stop. The captains in future must take a large share in the mine, and be bound to keep them. Not one should be allowed to go into mining in shares. Then they should lay open and find every lode in the sett, and find the intersections before the mine is sunk; and if they do not find one good mine out of five they should not be employed. Then mines would pay well, and not otherwise.

Being about to publish a book on mining, I may ask the following questions, not that I expect them answered. It will put men thinking to meet the age we live in.—1. What should a stratum contain to grow yellow copper?—2. What to grow blue lead?—3. What to grow blue antimony?—4. What to grow brown zinc?—5. What to grow sulphur-mundie?—6. What to grow arsenical mundie?—7. What is the use of arsenical mundie in a copper or tin lode?—8. What is it good in a lode for?—9. In what layer of the earth was it first formed?—10. It propagates, and goes from lode to lode?—11. If so, by what means?—12. Was the same arsenic placed in the layers or lodes as and where now found at the earth's formation?—13. Why do the three colours form to the best advantage in the low dark abyss of the earth, and as well all these seven, including the variegated colour?—14. Why do every rock, metal, and mineral produce a crystal of a kind, and all trigonometrically true?—15. For what use are they grown in the layer of the earth?—16. I have not written tin, as I believe that was first grown in granite before sulphur, arsenic, or carbon were found.

N. ENSOLL.

Wadebridge, Oct. 23.

PRACTICAL MINING—OBTAINING METALS FROM THEIR ORES.

Sir,—I was rather amused on reading in last week's Journal the long account of cleaning pyrites from sulphur, for the fact is it was known in this country 10 years ago, and used then for purifying the oxide of iron after the gas had passed through it. At that time Messrs. Warner and Co. had a patent for crushing the slag from the ironworks for this purpose. It answered very well, but the difficulty was how to renovate it so quickly that it could be used over and over again, the turning of it over and over in the atmosphere for the oxygen to act upon it being by far too long a process. As I had arranged the crushing machinery, they applied to me to help them out of this other difficulty, and I said the only plan I could suggest was to keep the stuff very thin and always in motion; in that way the sulphur would be exposed to the oxygen and taken up into the atmosphere. Well, the plan I adopted was simply a long cone, 3 ft. diameter and 9 ft. long, with a hopper at the small end for the oxide to be shovelled into. The axle with fly-wheel was made long at each end, so that a man could turn it by hand. Colours were a long fire-grate for coke, which could be raised or lowered at pleasure. The cone was then turned round by hand, and by the time the oxide had got to the far end it was virtually clean, but it filled the house so full of sulphur that it was impossible to live in it, so that it had to be used in the open air.

Dr. Phelps is quite right about the necessity for the stuff being fine—the finer the material is crushed the sooner and cleaner it becomes. I have mentioned the plan to several parties, but the fuel seems to be the great drawback. Coke is the best, but it would injure the cone after a time. The cone should have a few little of iron rivetted inside to make the stuff turn over and over as it rolled along to the further end, the great principle being to keep it very thin and always in motion. I know of no furnace that would be any use, as a heat of 550° Fahr. is required for carrying on the process effectually. Only get your quartz clean in this way, and the gold would be easily got.

By-the-bye, I may mention that I have to-day been favoured with

will by several people from Mexico, accompanied by Mr. John Peck. He says that my plan of stamps beds is the finest thing ever saw, and, coupled with my new amalgamator, would get gold in half the time they do now, and that there would be the advantage that more gold would be obtained; indeed, he declared that the whole arrangement is the most perfect thing yet constructed.—James-street, Old-street, Oct. 23. JOHN WALKER.

GREAT LAXEY MINING COMPANY.

Sir,—In his communication published in the Supplement to last week's Journal "Anglo-Manx," in common with a few other interested parties, takes exception to the fact that one gentleman acts as the double capacity of chairman and banker. I could point out to many instances in which this is, and has been, the case for many years past, both here and in England. Some of the gentlemen who are in their outery upon this subject occupy, indeed, an exactly similar position.—Isle of Man, Oct. 22. LAXEY.

MINING IN SHROPSHIRE—NORTH TANKERVILLE.

Sir,—If the gentleman who wrote in the Supplement to the Journal of last week on the above subject had appended his name to the letter I would with pleasure go into all the matters he has referred to, for his satisfaction. At present, however, and until I am certain that the gentleman is a shareholder, I shall confine myself to a defence of my own character as an honest man and practical miner. In reporting on the mine I have always given the shareholders a plain, truthful statement of how the mine looked on the day when I wrote. No discovery of lead ore has been made in the mine beyond the large rocks and the small parcel sold some time ago, which were raised by the tributers at and above the adit. My statement has been corroborated by the reports of several mining engineers of eminence, who have examined the mine for some time on several occasions, and, what is more, the mine is in a thorough working condition, and may be inspected by "Inland Victim" himself. I may say, too, that the workings have been carried out in a thorough miner-like way as far as we have gone—sinking the engine-shaft (which is now 45 fms. deep), raising the deep adit west, the 14 fm. level east and west, and sinking to the 30 fm. level, in addition to cross-cutting the adit at several points—as far as we have explored the mine, I think, everything has been done in an industrious and miner-like manner.

It is of opinion that the lode we have here is a continuation of the Alcester lode. It was the opinion, too, of many good miners, as far as my own belief, that no lode in the district showed finer prospects of success than did this along the back, in the shallow adit, even as low down as the roof of the deep adit level. See reports of Capt. James and Barkell.

In depth the lode twitches up, but whether this is a sign of wear-out or otherwise further development only can show. In the meantime the vein is large, but through it into the slaty beds, are in quantities was expected, the lode, as I have before said, is very small and unproductive. In depth a true lode like this would gain strength, and probably become productive; it would in that case follow suit with other mines in the locality which in time were no richer than North Tankerville is, but by being worked in depth are now paying large profits to the shareholders. JOHN W. POWING.

METALLIFEROUS MINES OF WALES.

Sir,—I venture to assume that the article in the Journal of Oct. 11, dealing the example set by the directors of the Cornwall Mining Railway in improving the means of communication with the remote mining districts of that county, was not written without some hint that exertions are on foot, and by responsible men, to secure such-like facilities of transport in the Principality. That better mountain roads should be made, that tramways should be introduced, are facts incontrovertible, and it gives me, as an insider in several mines in Cardiganshire, great pleasure to bear my testimony to the business-like earnestness of those exertions, and consequent probability of the early introduction of a narrow-gauge railway, to be constructed either from Llanfihangel Station of Cambrian Railway, or, better still, from a navigable point of the river at Yn-y-sas-lap through Talybont, and up either the Caelan or Gwyn Valley to the Esgair-hir and Havan Mines.

For reasons have only to look to the great prosperity which has attended the industrial works within reach of the facilities of transport afforded by the Festiniog narrow-gauge railway, the works of which has now a world-wide fame, whilst in a financial sense certainly the railway far exceeds in the Principality.

The district to be fed by the proposed railway is, if not the best, mainly the second best in point of mineral riches in this part of Wales. I say this because I presume that the valley starting from Goginan to the Goginan range may claim the palm in point of mineral riches, embracing as it does Bronllyd, Vaughan, Cwm-y-Cwm-Sebon, East and South Darren, and a host of rich mines, forgetting Goginan itself. However, be that as it may, the chosen valley accommodate Alt-y-crib, Nant-y-noed, Blach Caer, Esgair-hir, Esgair-frith, Havan, and Henfwith, and many other mines in the more western valley, the names of which I am not acquainted with, but in point of number they embrace many rich but undeveloped mineral properties, containing well developed silver-lodes. The spirit of your article in announcing that the Principality affords a great field for mining enterprise, and that mineral wealth therein abounds, with advantages for development rarely to be met with, touches upon facts incontrovertible in themselves, and which have only to be mentioned in these days of high prices to be thoroughly appreciated. It is a remarkable fact that capitalists and speculators will rush with avidity into schemes for abroad which are out of reach of their observation, and which, consequently, are hidden before the public with flaming reports and high-sounding names, when, Sir, as you say, there are lucrative fields of mining waiting at our very doors waiting for development, and that notwithstanding the immense advantages Cardiganshire possesses from almost boundless water supply, and the consequent non-necessity (except in solitary instances) for steam-power.

There is, therefore, every reason to expect that the common results of cheap and improved communication, if introduced, as is suggested, in Cardiganshire, will result in equally great benefits to its landowners, to capitalists, and to the working miner, as has already followed in the district of Festiniog. I also endorse to the full your statements as to the source of the prejudice which exists against Welsh mines and miners, but this might easily be overcome; and I now, and am pleased to record the fact, that efforts are also being made to do two things in furtherance of its removal, and in the general interest of mining:—1. The establishment of a syndicate which, so far as it may be able, secure for the benefit of its subscribers means of testing the truthfulness of the prospectuses of each new mine introduced, by obtaining information concerning, and, if practicable, reports upon, such properties by one or more of its appointed staff of mining experts, which reports shall contain all authentic and reliable information to be so given by totally disinterested first-class engineers.—2. To bring the influence of the syndicate, by and with the aid and co-operation of the principals of existing mining companies, to a well matured and united application to each and every landlord of mineral properties in this county, whereby greater encouragement may be afforded to the lessees and incoming capitalists, by the insertion of a clause giving a drawback on royalties for increased depths of working. This is what is wanted to secure the development of our mines, and it is only a reasonable concession for the landlords to make; and, furthermore, knowing, as they do, that great extra cost of working must be incurred, and that heavy outlay in machinery is required to draw to surface lead and other ores from the deeper sections of mines, as compared with the facilities of working and absence of water-power at levels which the undulating surface of this county admits of. I fully believe that if the application for such relief is properly put before them, in their own interests and that of mining generally, it

will be conceded. I am of opinion that if the large bodies of lead ore discovered in Cardiganshire were followed down by science, and by the aid of capital, there is no field that would produce better results to the capitalist, and to the community at large.

I enclose my card, with the hope that in future numbers of your wide-spread Journal we may see these subjects well ventilated by some of your numerous and talented correspondents. VIGIL, Abergystwith, Oct. 22.

CORNISH MINING—LORDS AND THEIR AGENTS—MINING ACCOUNTS.

Sir,—Mining in this county is indeed under a cloud, and it behoves all interested to try to promote a return to its ancient prosperity. I am not one of those who believe such a visionary as Mr. Barnard is going to make a revolution, but I believe that lords and their agents can do much towards a successful issue out of the present state of almost stagnation. We want, first, lower dues; next, just and honourable treatment. We do not want to be compelled to spend our money in a particular manner by an unprincipled and unjust agent, as is sometimes done, or threatened to be ejected. Mining leases as drawn now are entirely wasted parchment, and give no security to anyone but the lord, and no power to anyone but his agent. This will do very well when we have upright men to deal with, which, fortunately, is so in the majority of instances, but is not so always. Then, although these cases are rare, we have a case of unjust accounts, where the shareholders have to pay twice over, witness Kitty (Lelant); and where one official, it is alleged, sells all the tin for himself, as at Trencrom. This done, too, by a person who is supposed to stand high in the counsels of one of the lords of large domains and extensive mining property. Could such things exist if gentlemen cared much about the commercial integrity of their agents? ONE WHO HAS SUFFERED.

MINE MANAGEMENT—No. III.

Sir,—Merchants' supplies form a considerable item in the expenditure of all mining properties, more especially Cornish, where coal and other materials are so much required, and seldom is a balance-sheet issued free from a considerable sum due to merchants; this is so important in itself and consequences that I trust I may be excused in returning to the subject. It may surprise a few that throughout Cornwall there are but a small minority that do not owe merchants for several months' supplies. The one great evil of the Cost-book Principle is the insufficient capital raised at the outset, which does not enable the management to carry out the object of the promoters; if cost-book companies had a "reserve fund" the pursers could control the supplies, but without this he is comparatively helpless, and goods are sent in at the highest price, and sometimes of questionable character. This can surprise no one, for what is to pay the merchant for his, perhaps, 12 months outlay and risk? Under the limited liability system, adequate capital is in most cases raised to pay the bills monthly, and if this cannot be done companies should not be started; it is unfair to the merchant as to the shareholder, the former is deprived of his money, and the latter loses by the price charged, and forfeits the discount which monthly payments command. To remedy this, if a call is found necessary, make one to provide not only for debts but also for ensuing costs, for although objections may be raised to this, more especially that the burden would fall heavily upon large shareholders, they often pay very dearly for not facing this, perhaps, slight inconvenience. If pursers would raise sufficient means to pay the bills promptly they might command good supplies at cash prices, thus saving very considerably.

With regard to those in authority over the management of mines under the Cost-book System the control is generally with a committee of management, and if they would strictly attend to the duties involved upon them nothing could be more simple and effective, no fees given, and many expenses of a limited liability company are saved. It may not be out of place to remark that the respectability of a company may be tested by the position of its directors and secretary. At the same time too much reliance must not be placed even upon their position. It is within the experience of many that undertakings of the fairest prospects, with a board of directors to which no exception could be taken, have failed simply from mismanagement. Let directors be selected for their probity, who do not require large fees; an addendum to a chairman's name frequently implies from 400l. to 600l. per annum, the secretary in proportion, and a corresponding amount must be paid for "office," which are alike unnecessary. If under the protection and governed by the stringent rules of "limited liability" it be necessary to expend 1000l. or 2000l. a-year in the management the sooner we return to the old system the better.

In conclusion, from these few facts it is clear that the serious depressions that occur in the stocks and shares are in a measure due to the executive. Metal cannot be found where metal is not, but by a healthy management—bringing up costs, paying merchants promptly, and affording every information, all of which may be expected—the confidence of shareholders will be obtained, mining will take the position it deserves, and when a loss is made few will complain. Fortunes are made in commercial pursuits, manufacturing, farming, &c.; but storms and fires come, crops fail, and the result of the last instance is far more disastrous than the failure of any mining venture could be. The lode is less frequently poor than the crop, and the storm that sweeps the country passes harmlessly over the miner. The farmer often spends as much in harvesting as he afterwards realises, and manufacturers frequently sell their goods below cost; but no one would think of giving up business from exceptional contingencies. Why, then, should mining be decreed from occasional failures? Because in too many cases the shareholder feels he has not been justly treated. Anxious to offend no one, I trust I may succeed in placing mines under better management, and, above all, in rendering improved accounts in balance-sheets—then my letters will not have been penned in vain. E. J. BARTLETT.

30, Great St. Helen's, London, Oct. 23.

OLD TREBURGETT MINE.

Sir,—This mine, it is reasonably expected, will ere long become one of the most prosperous lead mines in Devon and Cornwall, as the monthly returns of ore are steadily increasing. Had it not been for the high price of coal, labour, &c., this undertaking would now be in the Dividend List, although at the present time a profit is being made, in addition to a large expenditure being incurred in opening out the mine in order to intersect the various lodes. This is energetically being done by the skilful and respected manager, Capt. Wm. Hancock. As a shareholder and a resident in Cornwall for many years, I cannot but say that I have every confidence in his superior judgment, and relying upon his opinion as to the merits of the mine I still hold my shares. Being conversant with the mode of setting to the miners generally adopted in Cornwall, I most certainly endorse the system which I understand is carried out at this mine by the agents—to give two months' contracts, which I am firmly convinced is the most economical plan in order to have the work done and the mine developed with the utmost dispatch. If this mode were adopted at mines generally it would be more beneficial to employers and employed. I certainly deprecate short "stents." While many mines have been and are still short of hands I hear that Treburgett has been an exception. From enquiries which I have made from disinterested parties in the district the miners there work from 10 to 12 hours per diem, and consequently earn good wages. The work done by several well known mine agents is that ere long Treburgett will be a flourishing mine, notwithstanding it has been stated by some "croakers" that there is no appearance whatever of a good mine in the North of Cornwall. SHAREHOLDER.

TIAN-BACH MINE—CARMARTHEN.

Sir,—Some short time ago I had the pleasure of visiting, in company with Mr. Stedman Thomas, of Carmarthen, the mineral farm of Tian-Bach, and thinking that it may interest some of your readers, I beg to give you a short account of it. The stratum is a very kindly blueish clay-slate, or killas, rivaling that of some of the finest lead and copper producing districts of Cornwall and Wales, and is peculiarly free from abrupt heaves and the disorder produced by violent igneous upheavals, so that I should expect to find the lodes keeping well to their bearing, and not presenting those numerous slips and dislocations and other abnormal conditions so frequently met with, and which sometimes so completely baffle the ingenuity of the miner who is attempting to follow the lode. There is a stream running through the farm, which contains sufficient water all the year round to work all necessary machinery. It was in this stream that the lodes were first observed, the hard quartz standing up in a ridge across the stream, the softer clay-slate being eroded. An adit has been driven 63 fms. to cut these lodes, and has passed through the backs

of several branch and flooken lodes, containing spots of galena and copper pyrites; the stratum throughout is highly mineralised. The main lode has not yet been cut, but it cannot be more than 10 fms. further on. The driving of this cross-cut was stopped for want of funds; an expenditure of another 40l., I believe, would have enabled them to cut the lode, and I have not the slightest possible doubt that it will be found a very rich one; such also is the opinion of Capt. J. Roberts and Capt. Matthew Francis, both of whom have given highly favourable reports on this property. A little to the north of the end of the cross-cut a winze has been sunk on a very kindly lode, and some spots of lead ore found. The sinking of this was stopped for the same reason as the cross-cut. With a very little expense the adit could be driven to come under this, and would effectually prove the lode. Besides the lodes I have mentioned there are several others: one, especially, further down the stream I believe to be a rich copper lode, for I found on the back of it some specks of copper pyrites, and some green malachite occurring as an incrustation. Altogether, I think the property deserves a vigorous trial. Captain Roberts says that he has not the slightest doubt that rich veins will be found in depth, and such is the opinion of many others. An outlay of 500l. in machinery would enable anyone to go down 40 fms., with almost certainty of finding abundance of lead. Mr. Stedman Thomas is very anxious that the property should be worked, and, I have no doubt, would make very favourable terms with any gentleman who would take it up. C. A. MOREING.

EAST VAN MINE.

Sir,—Your correspondent, who wrote in last week's Journal, and signed himself "A Considerable Shareholder" (if he is a bona fide shareholder), could have obtained all the information he wished upon applying to the secretary, Mr. F. Reed Wilson, of St. Helen's-place, London. I am a shareholder in this mine, and at high prices. I visited the property on the 7th inst., and after going underground the Van Mine with Capt. Williams went underground East Van, and was perfectly satisfied, in my own mind, that the shareholders will have a good mine here; it is only a question of time (they have plenty of money in hand), but may come very unexpectedly. The East Van Mine only started in 1871, and no time has been lost in sinking shaft, driving levels, and searching for a rich lead lode. They have the Great Van lode, but not yet sufficient lead in it to value. They are driving west towards the Van (and this is all they can do at present), and putting out cross-cuts to intersect the lead bearing part of the Van lode. I have no hesitation in saying if Capt. Williams gave his sincere opinion (which he always gives) in your Journal, and it was acted upon, shares would advance considerably in price, instead of being at 3l. 10s. or 3l. 15s. each. That the Great Van lode passes into East Van is a well-known fact, and with patience and perseverance it will yet become a first-rate property—not a doubt, a second Van; but if only one-quarter as good all will be satisfied. I cannot see how it can possibly fail, and if "A Considerable Shareholder" and others interested would but take a journey to Llanidloes, and inspect for themselves they would be of my opinion. I believe they have about 7000l. capital (cash) in hand. There is no desire on the part of anyone connected with East Van for "reference." The whole affair is conducted in a most straightforward, honest, and legitimate manner. The directors are large holders, wealthy, and influential, and the manager, Capt. Williams, is a thoroughly practical, able, and conscientious man. I advise the shareholders not to sell, but to buy and average their holdings at the present low prices.—33, Pall Mall, Oct. 23. H. GOULD SHARP.

Sir,—I visited this mine on the 7th inst., and went underground with the manager, Capt. Williams. I have never before seen such extensive workings, although used to Cornwall for the past 20 years. In the 45 lode is large, and very rich. An immense quantity of lead ore ground has yet to come away above the 45 fm. level. In the back of the 45 lode is 40 ft. wide, with huge masses of solid rich lead ore. Such a sight as this level presented is seldom, if ever, seen. It was indeed a grand spectacle to witness the immense deposits of ore. In the 60 level the ore ground has yet to come away, some 250,000l. worth. They are now down to the 75 fm. level, and will soon cut the lode, which will give another 250,000l. worth of reserves. Why should not the 60 and 105 when reached prove rich also? Very little ore has been taken away yet awhile from the 45 fm. level. The machinery is in magnificent working order, not to be surpassed, if equalled, in the United Kingdom. Here is a mine which will pay dividends for a long time to come. Shares came out in 1869 at 4l. 5s. each; they have since given 11l. 2s. per share in dividends, and stand at a market price of 38l., a good and perfectly safe investment at this price. They sell 500 tons of ore per month and 150 tons of blende. East Van adjoins this celebrated mine, on the same lode, and I believe must prove a rich property. Even this great mine, like East Van, has its enemies.—33, Pall Mall, Oct. 23. H. GOULD SHARP.

ROMAN GRAVELS.

Sir,—I visited this celebrated old mine on the 6th inst., and found everything in first rate trim, the mine richer than ever, huge blocks of rich lead ore were coming up from the 60 fm. level. The present company was started in 1870, shares were then 7l. 10s. each, now 20l., and paying 17l. 14s. per share yearly in dividends. The reserves are estimated at 500,000l. This mine will pay dividends for a generation to come. They began with selling 80 tons a month, and have since increased to 230 tons; this will be increased gradually to 300 tons per month next year: hence dividends must increase, and shares rise in value. By so doing he will not only be able to continue this sampling but increase it when commenced. I have no hesitation in saying Ladywell will prove a second Roman Gravel, and shares which can now be bought at 3l. 10s. to 3l. 15s. will be 6l. to 8l. next year, and 10l. to 12l. in 1875, and paying good dividends. It is one of the greatest certainties of the day, and requires but to be seen to be appreciated. The mine adjoins Roman Gravel, having parallel lodes, and is opening up beyond the most sanguine expectations. Several of the Van, Roman Gravel, and East Van directors are also directors of the Ladywell, a sufficient guarantee to the respectability of its management. They have about 10,000l. cash in hand. P.S.—My opinion of Ladywell is founded upon that of Capt. Waters (the manager), and Capt. Williams, of the Van, and other practical knowledge and reliable information, and from personal inspection. H. GOULD SHARP.

LADYWELL MINE.

Sir,—After visiting the Roman Gravel, on the 6th inst., I went underground in the above mine, and was greatly surprised to find such a splendid property: next to the Roman Gravel this will be the great mine of the district. Capt. Waters, the manager, pointed out one spot where he could get 50 tons of lead ore per month, with six men, at once; but before doing this he will get more, and increase it when commenced. I have no hesitation in saying Ladywell will prove a second Roman Gravel, and shares which can now be bought at 3l. 10s. to 3l. 15s. will be 6l. to 8l. next year, and 10l. to 12l. in 1875, and paying good dividends. It is one of the greatest certainties of the day, and requires but to be seen to be appreciated. The mine adjoins Roman Gravel, having parallel lodes, and is opening up beyond the most sanguine expectations. Several of the Van, Roman Gravel, and East Van directors are also directors of the Ladywell, a sufficient guarantee to the respectability of its management. They have about 10,000l. cash in hand. P.S.—My opinion of Ladywell is founded upon that of Capt. Waters (the manager), and Capt. Williams, of the Van, and other practical knowledge and reliable information, and from personal inspection. H. GOULD SHARP.

EAST WHEEL LOVELL, AND ITS MANAGEMENT.

Sir,—I am a dissatisfied shareholder in this mine, and as I cannot afford time to attend the meetings in Cornwall I shall be much obliged if you will let me state the grounds of my discontent. Take the statement of accounts at the last meeting—the Cr. side is up to the very date, August 29, while the costs on the Dr. side are only charged to April 26. Then the agent's report that a good profit has been made from twotwork, which has been expended in Tregeonbeis—in teubris, they might have said, so far as the shareholders are concerned. These mine meetings, as described in the country newspapers, seem to be very pleasant affairs; there is a dinner afterwards, at which the agents praise the pursers, the pursers praise the agents, and all goes off harmoniously. I will gladly give my proxy to any shareholder who will propose at the next meeting that all future statements be examined and signed by an auditor. It is the only business like way of conducting a company. It may be said that it is unnecessary in mines on the Cost-book System because every shareholder is entitled to examine the accounts. But it is well known that what is anyone's business is never done. I am interested in mines on the Cost-book System, the accounts of which are passed by an auditor, and I am resolved never to take shares in another mine where this necessary check is not enforced. DAYLIGHT.

LLANARMON MINE, AND ITS MANAGEMENT.

Sir,—Some six months ago I enquired through the Journal if anyone could give me information about the above mine. The following week, through the Journal, I was told "if I read the Journal I would not require to put such a question." I went back some months, but could not find anything, so I thought I would wait a bit, and I now put the question again. Can anyone give me some information about the above mine? I would like to know whether there is any truth in the rumour that for every two men employed in the mine there is one official; by this I mean the directors, office in London, pursers, his clerk, captain, &c. I would advise my fellow-shareholders to scrutinise the next balance-sheet. SUBSCRIBER.

WHEEL VINCENT TIN MINING COMPANY (ALTARNUN). Sir,—As we are ignorant of the name and whereabouts of a "Shareholder," we were left to judge from his writings who he is, and to guess that he lives in a world of fancies, where, for his writing is couched in uncertainties, such as "It would seem," "There seems to be," "I presume," "It appears to me," &c. Has he in his region of fancy seen a ghost which goes about terrifying shareholders? Such a ghost may appear in the region where he lives, but it has not appeared this way. Were I disposed to criticise "Shareholder's" letters I see sufficient in them to require a longer reply than I have any inclination or time to write. In his first he says one agent is sufficient to manage Wheel Vincent; in his second, in case of mismanagement, "there seems to be" no other alternative than to secure better men to manage the men. Has it appeared to him since he wrote his first that one man is not sufficient? As to the agents' knowledge of tin, I see no such paradoxical appearance, nor suggestive appearance, as "Shareholder" intimates. Nearly 30 tons of tin raised and sold is a proof that the agents knew tin when they saw it, and the fact that they cannot see tin where it is not does in no sense imply that there is no tin in Wheel Vincent at the present time for them to sell or see. If "Shareholder" will read the agents' last report in your valuable Journal he can tell where there is tin to be seen, and they know it; and where there is none, and they cannot see it. I would advise "Shareholder" to withhold his pen until he has something real to write about, and not indulge in such fanciful appearances; to think before he compares the committee to beasts laden with gold, and the manager with having grossly perverted the truth, and to stay at home, look after his station, and see that the trucks do not get off the line. ANOTHER SHAREHOLDER.

WHEEL VINCENT TIN MINE.

Sir,—A "Shareholder," writing in last week's Journal, accuses Capt. Gifford of perverting the truth, and making wrong statements, but he does not give one single instance in which this was done. It is most easy to make a charge, but not easy to produce proof. The writer of the letter certainly knows nothing about mining, as he seems to think that tin seen in a lode last year must be seen this, forgetting that

all lodes vary in value—in fact, lodes are sometimes of great value in one place and quite valueless in another. I would advise "Shareholder" to study his subject a little before he writes again, and not reflect on the character of another.

ANOTHER SHAREHOLDER.

FRONVELLAN MINE, MONTGOMERY.

SIR.—This mine several months ago was reported in some quarters to be of such a promising character that it had caused quite a *furore* for mining in the neighbourhood, and that all mining sets in its vicinity were being eagerly taken up. On looking at the weekly reports we find the same statements from week to week and month to month. It is said that as soon as communication could be made between the deep adit and mine there would be 70 fms. of backs available for stopping purposes. Since then I find a dump is being sunk in the deep adit. Perhaps some of the more enlightened shareholders will oblige by solving this part of the Fronvellan problem. Why is the deep adit not driven east? It was computed some months ago that the deep adit level would produce 2 tons or more per fathom, as has been reported. In the last report (*Mining Journal*, Oct. 11) I see there is not a single stop referred to. If there are 70 fms. of backs available for stopping, why not open them up, and work the mine more legitimately and miner-like? The amount of bustle and fuss made, and the little that is done, reminds one forcibly of "a mountain in labour to bring forth a mouse." According to reports of this mine there are 70 fms. of backs, any amount of ground in extent east and west, which produced for a great length 2 tons of lead ore per fathom, and a sufficient time has now elapsed for the construction of dressing-floors, and to lay open numerous stopes, and yet there is no lead ore to give any returns of value on the outlay. Does not such a fact as this suggest something rotten in the state of Denmark. This is the sort of mining that deters capitalists from investing money in the mines of the Principality. I trust the shareholders will, without fear, arouse the directors to a proper sense of the duty they owe to their co-adventurers.

INTERESTED.

ENGLISH MINING—ITS PRESENT AND FUTURE.

SIR.—I hasten to respond to the esteemed favours of your correspondents of last week. "Fair Play" desires an open discussion upon the matter, and will be surprised at nothing—a man of sense, with a flavour of pure logic, "Looker-On" has got an easy berth, and aims at compliments; flattery is often more palatable than profitable, but simply in my case as a novelty it is refreshing, and I credit him with his good wishes. "Old Miner" tells me that I can have any quantity of mineral matter giving 1 to 2 per cent. copper, but he doubts if it will average more than 3 to 4 ounces silver per ton; and "Observer" asks for the name of just one copper mine in this district that will average 1 per cent. copper and 6 ounces silver per ton. I could mention dozens, but take for instance the Devon Consols, Gawton, Hingston Down, Wheal Crebor, Virtuous Lady, and Wheal Barnard. Now, every particle of the copper and tin lodes in this last-named mine will average 25 to 35 per cent. arsenic, 8 to 12 ounces silver, 2 to 3 per cent. copper, and 20 to 28 lbs. tin per ton of stuff. But I have no desire at present to speak of Wheal Barnard; works are now being erected at this mine to carry out my ideas, and the tale will tell itself shortly, and if a myth the world will soon hear of it, even should the bushes of your humble servant not permit him to openly acknowledge its reality. In the meantime let me have my expectations a few miles in this district before the eyes of mining men are opened, as I quite anticipate that many will have sufficient assurance to claim my birthright, and the mess of porridge into the bargain; in fact, I believe if I made blood gush from a stone someone would desire to claim the novelty. Well, we will take the Prince of Wales; the past three months they sold 151 tons copper ore, realising 636l. 6s. 8d., or about 4l. 4s. per ton, an average of something over 7 per cent. copper; now, we will say, for round figures, 80 tons per month, 7 per cent. average, realising 4l. per ton, or 280l.; that this is not discovered, dressed, and ready for sale, but that the mine produces 100 tons of stuff, and the dressing alone is a serious item, and the carriage of 50 tons from the mine to the quays, and thence into Wales, is no imaginary cost; it means money, and directly or indirectly is out of the profits or the income of the shareholders. It is quite certain that several hundred tons have to be handled to get 50 tons 7 per cent. ore, and as I aim at an average of 2 per cent., the 50 tons 7 per cent. mean 175 tons 2 per cent., to which, without fear of any mistake, we may add another 175 tons of mineralised matter, but not rich enough for the smelters, giving 2 per cent. copper; thus we have 350 tons 2 per cent. ore, instead of 50 tons 7 per cent.; and I have a specific reason for regarding a richer produce than 2 per cent.; in fact, on a large scale, and with sufficient plant, 1 per cent. will answer my purpose best, as 1 per cent. copper ore will average 60 oz. of silver, when picked "prills" giving 20 per cent. are often not more than 1 oz. to the ton richer. But we are now speaking of the Prince of Wales, and the 350 tons 2 per cent. ore will not contain less than 8 oz. silver per ton, or a value, after allowing for 15 per cent. loss, and other small incidentals of 30 per cent., this gives 1050l.—say, 1000l.—and a cost of 1l. per ton for the treatment by the new process will leave 550l. per month instead of 200l.; again, the old cost of dressing and carriage has to be deducted upon my 1l. cost, so that without the shadow of a doubt we have 550l. instead of 200l. I do not go into the value of sulphur, arsenic, or tin, but simply calculate the copper and silver. Two per cent. ore means 2 per cent. pure metal, or about 15 lbs. metallic copper in a ton of ore; 75 lbs. 60 per cent. copper precipitate thus exists in 1 ton of ore, and 30 tons ore will give 1 ton 60 per cent. precipitate, with 8 by 30 = 240 ozs. silver; however, until the new book is thoroughly learned, and more competent men than myself take the matter in hand, we will allow the proceeds of 5 tons for loss. We have thus 35 tons instead of 30, yielding for 350 tons treated 10 tons 60 per cent. copper precipitate, containing 240 ozs. silver per ton, for which the smelters will readily give 150l. per ton, as it has a money value of 110l. to 115l., and if they will not then turn the silver and copper into pure metal, but put it into the hands of the smelters, and almost the same value may be said of other mines. As for the Devon Consols they have lost millions of ounces of silver, besides having almost given away thousands of pounds worth of copper.

We will just suppose that they had never had any dressing-floors; then make a calculation, bring all their ores to 2 per cent., and chemically treat them, adding 60 oz. of silver for every ton, allowing the usual discount of even 15 per cent. loss, and what is the result? Simply that if they have made a fortune they have also allowed two or three to slip through their fingers. One ton of ore containing 45 lbs. of tin and the average of the country is only 20 lbs.; cannot be brought to pure tin without considerable labour and expense. The many acquainted with tin-dressing will bear testimony that it is an almost endless task of washing, dressing, &c. Neither can the low-class, hitherto valueless, silver and copper be converted into their prospective metals by benevolent smiles and good wishes; but in 24 hours they can be brought to a money value of 100l. per ton and upwards by a thoroughly sound and inexpensive process; for, although 1l. per ton is allowed for cost, it cannot, upon a large scale, cost more than 10s. The chief item is chlorination, which means coal, salt, and labour, so that the sulphides of copper and silver may be changed into chlorides, and the patent calciner of the present day will do their work effectually, and with very little coal and labour. I sincerely trust that your correspondents and readers will not misunderstand me. I am no miner, but am simply trying to do mining good—indeed, eight years since I hardly knew a pick from a gad; but some get over the ground faster than others, and twelve months later I had served a severe apprenticeship, by making and spending a little fortune, including the driving a 30 fathom level with my own hands, in not over easy ground. Well do I recollect it. "Memory still brings back the feeling" when pick, gad, and T. J. Barnard were bosom friends. Echo says happy days; then Echo says, for I was as miserable as a cuckoo; and should any of the many self-made men ever address you, Mr. Editor, with long harangues that they enjoy their yacht or four-in-hand less than the days of heavy manual or mental toil, credit them with a large amount of humbug, and pass a journal entry to their debit that they might be always expected, under any circumstances, to attempt to shift work upon somebody else's shoulder. Yes, I have driven pick and gad 30 fms. underground, and have also driven pen and ink a few score fathoms for the welfare of mining. Again, I have driven tandem a few fathoms in the fashionable West End drives, and if choice is to be consulted I infinitely prefer the latter. Strange, but true, this is a broad hint; and perhaps it will be remembered by-and-by, when the many poverty-stricken "bald" are rolling in wealth from the returns of poor-class silver and copper now ignored. Little fish are the sweetest, if you can only catch them; but where are we? I have almost lost myself. Well, neither am I a practical chemist. My only real profession is an accountant, and in this one, and only one, particular department do not insult me with second fiddle, or I decline to handle the instrument. If any of your readers require a practical mining engineer or analytical chemist, do not seek my services; but if they desire an efficient accountant and secretary, one thoroughly at home in all the duties of an office, I can recommend a first-class man—a generally useful individual, who can always make the best of a bad job, and blow his own trumpet, or anybody else's, if the hummer takes him—a man who can also raise the wind, if required, for a good purpose, not in a humorous tone, but by the wafting of a gentle reply breeze. Yes, friends, let the secret *come out*. I am what I am—a perfect quack. Open confession is good for the soul, and I feel relieved already; but perhaps in this instance, as in many bodily complaints, the quack will find a safe or specific ointment for the long run of diseases hereditary in mining, and actually effect a profitable cure, when professional men with a long array of diplomas have given up the case as hopeless. In conclusion, let me remark that if we only extract the low-class silver and copper at a small profit, what would have been the result ten years since, when copper was 50 per cent. dearer, and coals and salt, the main ingredients used, 100 per cent. cheaper? Well, I make my bet with one happy consolation, that I have set myself a task which must be of advantage to adventurers (permit me just one little, gentle rub at the soles), for it

cannot fail to either unveil the enormous mineral wealth of Devon and Cornwall, or, on the other hand, expose the destitute nakedness of the land.

THOMAS J. BARNARD.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—The utter ignorance of the affairs of the company displayed in the second letter of the anonymous writer who signs "A Shareholder" in last week's *Journal*, proves that he is no shareholder, or that he became one without the slightest examination. In his previous letter he insinuated that the dividends were not paid out of profits. I replied that the profits had been so large that not only could dividends be declared, but that the directors were enabled at the same time to pay off 15,000l. from the loan account. In answering one who professed to be a shareholder, I credited him with having read the statements from time to time issued by the directors. If he has seen those he is guilty of a false suggestion by again insinuating that the dividends were paid out of borrowed money. The loan referred to was taken up 15 months since in order to erect additional works, supply more powerful machinery, and make the purchases deemed necessary. The original working capital, after deducting preliminary expenses, was only about 17,000l.; the cost, I believe, of the existing plant and works has been over 25,000l.

Now, as the balance of the loan is only about 14,000l., there is this value in plant to set against it, as well as the large excess of expenditure in the new mines acquired over the new stock created, and then there stands the further fact, communicated to us all by circular on October 11, that the profits for August and September amounted to 27,000l.; there was, therefore, at the time of payment of the dividend, on the 13th inst., in plant and profit realised, a value of 52,000l. in addition to the amount of unpaid calls on the last issue of new stock. As the anonymous writer in question ought to have known all this as well as I do, he must excuse my belief that he has either assumed a false title or that he has joined the company for sinister objects.

If your anonymous correspondent's insinuation, "as to the vendor selling his shares," applies to Mr. English, the vendor, I state from my own knowledge that he has recently bought a large number of shares at a high premium.

London, Oct. 25.

EDWARD APPELGARTH.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—There is some excuse for a man who commits an error when he has the grace to acknowledge it. There may be some good reason for a man's writing anonymously if he confines his statements to facts. The persistence shown by the writer of the letter in last week's *Journal*, in reiterating his statements that, because there was some balance due on the loan account, therefore the dividends had been improperly declared, proves that his object was not to enlighten his fellow-shareholders, but to damage the company in the opinion of the public. Did he ever look at the balance-sheet of a bank, or of any firm of traders, without finding debits on one side as against assets on the other, and profits declared where the latter exceeded the former?

I understand from the statements issued to the proprietors that the whole amount of indebtedness of the company, beyond the amount to be received on calls on the last issue of stock, is about equal to two or three weeks' profits. Possibly, then, it is wrong in a writer professing to be a shareholder, and who, if so, knows the fact by results, should repeat his insinuations after they have been so publicly refuted. The Richmond Mine is far too good to be injured by all the writers in the universe; but such attacks are evidently made with the object of frightening timid shareholders into selling.—London, Oct. 24.

S. A. POSTLETHWAITE.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—Your correspondent last week echoed the opinions I have entertained and expressed for some time past. We can no longer accept "cable messages" as trustworthy, and especially when they partake of a sensational character, issued and published to produce an effect. What is the use of being told that "the monthly profits exceed 13,000l." and that the "developments are progressing splendidly," when others say—and seemingly with equal authority—that the property "is being worked much too fast" and that the "present output cannot be maintained." But taking the semi-official statement as a solid fact—that the present reserves are sufficient to maintain the current rate of production for two or even three years, what per cent. does it represent? Possibly 35 per share, even supposing the "measurements" and "measurements" to be borne out by results, which, as we know to our cost, has not always been the case where learned professors have made "measurements" of reserves elsewhere. To say nothing of the costly and most disappointing delays inseparable from an Eureka winter, impossibility of obtaining charcoal, and oftentimes of hauling ore, there are sound conservative reasons why a totally different policy should be pursued to that which now seems the dominant object of the board, or, perhaps I should say, those who are pulling the strings.

The letter of Mr. Applegarth was, indeed, "plain and unvarnished." He tells us "that he had bought the shares," and, after having bought, he writes an inflated "bullish" communication, under the impression, no doubt, it would "lift the shares," and when "lifted" it may be supposed that that facile operation known as "sifting" will be set in motion.

It is always a thankless task to "paint the lily and to gild refined gold," but each may be purchased at too high a price, and so may Richmond shares.

Longham Hall, Oct. 21.

ASGILL-JONATHAN.

MARBELLA IRON ORE COMPANY.

SIR.—As your readers may not be aware, I think it as well to inform them that the shares of the above company are very scarce for delivery, so much so that 1s. 6d. a share had to be paid for a loan of shares a fortnight last account in Glasgow, and as backwatering is likely to be much higher on Monday the shares are very safe to buy at once before the rise takes place, because if holders do not deliver the price is bound to go up, and it is possible the "bear" sellers may be completely cornered, and in order that this may be the case the public should buy as many as possible, so that these unscrupulous men may get a lesson they will not forget, and this and other stock saved in future from their operations. Last winter these shares were run up to 40s., and the account is much more favourable now for such an operation, so that shares are cheap at 5s., being half the original price. I may explain that the reason "bears" have been caught is that after the last meeting they began selling, thinking to get holders also to sell, but, instead of selling, holders bought, so that when the time for delivery came sellers could not deliver. I, therefore, hope all will buy as largely as possible to-day—Saturday or Monday at latest—for present account in Glasgow.

SHAREHOLDER.

MARBELLA IRON ORE COMPANY.

TO THE EDITOR OF THE NORTH BRITISH DAILY MAIL.

SIR.—Perhaps, as the matter is, no doubt, of interest to many of your readers, you will allow me space to reply to a letter which appears in Saturday's *Mining Journal*, dated Glasgow, Oct. 16, and signed by a holder of 100 shares in the company. I had occasion to investigate the matters he refers to through a correspondent in London, previously to selling out my shares, which I did a short time ago. My correspondent obtained his information from the Joint-Stock Companies office, in Sergeant's Inn, London, and I am, therefore, in a position to reply to your contemporary's correspondent as follows:—1. The profits of the purchase-money, but a deed recorded at the Joint-Stock Companies Office shows that they were to receive 7500 fully paid-up shares of 10l. each.—2. Messrs. Malcolm & Co. were 5000 of these shares to be retained as a guarantee, and transferred the remainder as follows:—1250 to Messrs. William Scott and Clavering, of Glasgow, on Sept. 13, 1872; and 1250 to the Credit Foncier of England (Limited), on Nov. 5, 1872.—3. The *Mining Journal* correspondent is, therefore, correct so far as regards Messrs. Scott and Clavering still holding 1250 shares, but I think he is wrong with regard to the 1250 shares of the Credit Foncier, because my information is that that company transferred their shares as follows:—375 on Nov. 14, 1872; 500 on Nov. 21, 1872; and 375 on Jan. 14, 1873. It is quite possible the Credit Foncier Company may have re-acquired these 1250 shares, but I don't think it likely.—4. As to whether the recent rise in the price of the shares is only a rise on the part of large holders to get rid of their shares at a better price, or whether it is due to some gratifying news which is at present unknown to the shareholders, I should advise the "Holder of 100 Shares" to consult Mr. Clavering, who, he finds, is a recent buyer; or, if he cannot get an introduction to that gentleman, he should act on the advice of his broker.—5. Lastly, shareholders in any limited company who are in doubt as to whether they should hold on or sell their shares, will often find some useful information by perusing the register of members either at the company's office or the Joint-Stock Companies office. For instance, when Emma shares were very high a perusal of the register, disclosing the fact that Mr. Park was selling his shares, might have induced cautious shareholders to have sold out in time.

Glasgow, Oct. 21.

A LATE SHAREHOLDER IN THE MARBELLA IRON ORE COMPANY (LIMITED).

EMMA MINE—GENERAL SCHENCK.

SIR.—"Tis true, 'tis pity—pity 'tis 'tis true" that a "vindication pamphlet" is about to be scattered broadcast among English capitalists. Two years and more have elapsed since the "patronage of the United States Minister" lent lustre to that argentine deceiver, Emma, and it has not been considered necessary to "proclaim upon the house-tops" the ineffable innocence of the victimised General until his name is thought to be essential to add equal lustre as the head of a telegraph company. The strangeness of this "vindication," however, is in the fact that the vindicators—the pamphlet is not supposed to emanate from General Schenck—do not regard it as at all important to "make a clean breast of it" to the original Emma shareholders, but exclusively to those whom it is delusively hoped may be induced by the "vindication" to become shareholders in the new creation. Some weight might have been attached to the "vindication" had it appeared when it was called for, but since it is to be put forward as a lever to uplift another enterprise it can only "vanish as thin air," and if productive of any effect at all, certainly not in "lending lustre" either to General Schenck or the present inchoate conception.

Oct. 23.

THE UTAH SILVER MINING COMPANY.

SIR.—Will you kindly allow me a small space in your valuable *Mining Journal* in order that my fellow-shareholders may be moved to action at the next meeting of the Utah Silver Mining Company, with a view, if it is possible, to extract the truth from the directors of the company. I unfortunately invested very largely in this concern on the faith of the statements of a director, but I regret to say that not one of

his assertions has come true. A few months back Mr. Longmaid was selected for the new management; we heard marvels, indeed, as to this gentleman's energy, and a few weeks afterwards, he wrote extraordinary tales from the mines, and ended by stating that a dividend would be paid in the autumn now fast closing, but, instead of a dividend, a meeting is called for the 31st inst. to make a call of 10s. per share, and this was the best mine in Utah; in fact, according to one statement—the "American Van."—London, Oct. 23.

A LARGE SHAREHOLDER.

[For remainder of Original Correspondence, see to-day's *Journal*.]

UNDERGROUND HAULAGE IN MINES.

At the last meeting of the Dudley Institute of Mining Engineers, Monmouthshire, on the subject of the application of compressed air to engines used for underground haulage. Before reporting this North of England Institute of Mining Engineers held a meeting in Birmingham, the president of which was the famous Nicholas Wood, undoubtedly the foremost mining engineer of his generation. Speaking on the subject of underground haulage, on which Mr. R. Bailey, F.G.S., had just read a valuable and instructive paper, Mr. Wood observed, "I have paid great attention to this subject, which I consider one of very great importance. So far as my experience goes, I think that when there are three horses required to do any amount of underground conveyance it is high time to consider whether a steam-engine ought not to be employed, but certainly wherever five horses are required for haulage purposes underground, it would be most advantageous to use engine-power, and here let me say that it is not such a formidable matter as most people conceive to put an engine underground. I am quite sure that if general attention were more directed to this subject, very great savings would be effected by the use of small engines instead of horse-power in the underground conveyance of coal. Mr. J. T. Woodhouse, C.E., of Derby, said at the same meeting, 'My own experience is that the cost of each horse is equal to 1000l. capital.' All this was calculated in 1861, when in South Staffordshire the report of Mr. Blackwell was—Trade bad, no orders, coal and ironstone too expensive, cost of getting too much. Dead charges too great. Twenty mills and forges standing. All this presents a contrast rather than a comparison with the existing idea of affairs, and the following description of a new and improved plan of underground haulage cannot fail to elicit much public attention.

THE APPLICATION OF COMPRESSED AIR TO UNDERGROUND HAULAGE.

By ARTHUR J. STEVENS, Uxbridge Ironworks, Newport, Monmouthshire.

The use of compressed air for underground haulage is becoming much more general year by year, notwithstanding a good deal of prejudice against it on account of its alleged costliness, but of course of time there can be very little doubt that it will be frequently applied, for the following among other reasons. It appears uncertain whether boilers underground may not be actually prohibited, and should these boilers be placed on the surface the many evils of long steam piping will in such cases be increased, and again the probability of the successful application of coal-cutting machines to certain seams must be taken into account when laying out new work. It is almost certain that no power other than compressed air will be applied to such machines, and compressing machinery on the surface will thus be necessary, and it will then become a question whether it will not be most economical to use it for all purposes underground, replacing steam, horses, and ponies. I hope in the following paper to be able to show the relative cost of steam and air as at present applied, and how the economy of the latter may be increased by the use of machinery specially designed for the purpose, and how its use may be extended with advantage.

Underground haulage may be roughly divided into two systems—first, that in which the hauling engine is constantly running with a comparatively light load, as in the case of the endless chain system, and the other is that in which the working of the engine is at longer or shorter intervals, with a comparatively heavy load, which I will call intermittent winding, and is represented by the tail-rope system. The engines to do the work in each case are different; in the first where constant winding is going on a small engine is required, and consequently the stamping is of small diameter. In the other the pipes being proportioned to the larger engine to which the supply steam must be of large diameter, and it follows, therefore, that although the total amount of hauling done in a day is the same in each case, yet as the loss of heat by radiation is nearly proportional to the exposed surface of the piping, that the amount of steam wasted by radiation in constant winding is less than in intermittent winding. If air were supplied through pipes instead of steam, the only cause of loss will be due to the reduced volume or pressure caused by the reduction in the temperature of the compressed air, and will be entirely independent of the size of the pipes used, the length of time which the air remains in the pipes; the loss in the case of air will, therefore, be proportional to the work done, while the loss in the case of steam will be in proportion to the size of the piping and the number of hours the steam is in the pipes. It will be seen, therefore, that in comparing steam and air the latter will stand to best advantage when the work below is intermittent. In many situations either steam or air may be used, and in order to make comparison I will take the case of a winding-engine placed at the bottom of the shaft, with the boiler on the pit top, the engine to haul a single cylinder of 20 in. diameter, with a stroke of 5 ft., the hauling to be done on the tail-rope system, the steam-pressure to be 50 lbs. per square inch, and the engine to run at 30 revolutions per minute.

In order to show how steam is often wasted underground, I ascertained by experiment in a South Wales colliery the amount of water condensed in the pipes before the steam reached the engines. The pit in question was 333 ft. deep, and the steam was conducted down in uncovered 6-in. pipes, and was then carried along for 243 ft. to the winding-engines. The following are the particulars of the engines, &c.

| | |
|--|--------------|
| Steam-piping 576 ft. of 6-in. pipes. | |
| Surface of ditto about 1150 superficial feet. | |
| Diameter of cylinders | 15 inches |
| Number of cylinders | 2 |
| Stroke of piston | 5 feet |
| Number of revolutions in one journey | 462 |
| Number of journeys per day | 12 |
| Time running one journey about | 10 minutes |
| Number of hours steam was in pipes | 10 hours |
| Pressure of steam | 40 lbs. |
| Steam cut off in cylinder at $\frac{2}{3}$ lbs. stroke. | |
| Cubic feet of steam in one revolution | 11 |
| Cubic feet of steam in one journey | 5,062 |
| Cubic feet of steam in one day | 60,744 |
| Quantity of water condensed per hour | 45 gallons |
| This at 40 lbs. equals in cubic feet about | 25,000 |
| Cubic feet of steam condensed in 10 hours | 250,000 |
| Amount of steam used as above | 61,000 |
| Total steam used and condensed equals in cub. ft. 291,000. | |
| Percentage condensed | 78 per cent. |

This great waste of steam was no doubt excessive, and mainly due to the pipes being uncovered, and with well protected pipes the loss from this cause would probably not be very great. I am not aware of any experiments showing the loss of heat in covered pipes; the loss, however, must be something, and I will assume that it would not have exceeded 20 per cent. had the pipes been clothed in the example given, and it should be particularly noted that, as I said above, this loss is continually going on the whole time the steam is in the pipes, and is almost independent of the amount of work done. The losses and difficulties arising from the use of steam underground are mainly the following:—

- 1.—A considerable loss of steam through condensation in the pipes.
- 2.—The heat of the engine-room which in the colliery where I made the experiment was 92° on a day when the external temperature on the surface was at the freezing point.
- 3.—The heating of the air by the steam-pipes, which in the case given was taken down the main road at 76°, when it would otherwise have not been very considerably above freezing.

4.—The consequent injury to ventilation.
5.—The difficulty of getting rid of the exhaust.
6.—The necessity of providing expansion joints at frequent intervals, which give no end of trouble.
7.—Frequently the impossibility of placing the engine just where you really want it, and of taking it any great distance from a shaft.
To return now to our 20-in. engine by 3-ft. stroke. The winding-engine's steam cannot be used expansively to advantage in consequence of the difficulty of handling, and for the purpose of comparison we will suppose the cylinder to take steam all through, and to run at 30 revolutions per minute. The quantity of steam required will be area of piston \times stroke \times number of strokes, and will equal about 392 cubic feet per minute, and develop about 51 indicated horse-power. This will be the actual quantity of steam required below, and to allow for condensation in pipes we will in this case take the very low estimate of 10 per cent., which will necessitate 430 cubic feet being delivered by the boiler above.

The question which we must next answer is this:—How much steam must be used in compressing air to do the same work? And steam must be to the main and most valid objection to the use of compressed air. As stated above, we require 392 cubic feet of air at 20 lbs. pressure, to be delivered at the condensing engine every minute. In order to obtain this quantity we must start from the compressor air-cylinder above, with a considerably larger volume, owing to the heating and expansion of air during compression, and its subsequent cooling and contraction during delivery.

For the purpose of calculating the temperatures, &c., which follow, we have made use of the tables calculated by Dr. Joule, of Manchester, and published in "Bourne on the Steam Engine." The temperatures and quantities dependant thereon are, probably, too low, which would give a too favourable result; on the other hand, the temperatures actually reached in practice in the compressing-cylinder are not nearly so high, in consequence of the cooling of the cylinder by radiation, and by means of a water-jacket. On the whole, we may take the tables as approximately correct. In these tables, the atmospheric pressure is taken at 15 lbs., and its temperature at 32°. For the sake of convenience, we will suppose the air below to be of the same temperature, though this improbable supposition is to the disadvantage of air. We will give to our air press a piston, with an area of 1 square foot and a stroke of 12 ft., and it will be found from the tables that a pressure of 30 lbs. will be reached when the piston has travelled 64 ft., with a corresponding temperature of 192° Fahr., and, consequently, it will have to press 14 ft. of heated air into the receiver against a pressure of 30 lbs. per square inch; but this 54 ft. of air, in cooling down to the temperature of the external atmosphere, will be found to have dwindled down to 4 ft., which is in fact the exact quantity the compressing piston would have had to force into the receiver if no heat had been generated. We here have what appears to be an inevitable loss of 5 per cent. In order, therefore, the supply the 392 ft. underground air-press (double acting) of the dimensions given must make 39 revolutions per minute. The power absorbed in expelling these 4 ft. will be found as follows:—Area of piston 144 square inches \times 30 equals 430 lbs., equals total pressure on the piston. As this is moved through a length of 54 ft., the work done is equivalent to 23,238 ft. lbs.

In addition to this, there is the power required to reach the 39 lbs. pressure represented by the curved part of an indicator diagram; this will be found from the tables to be about 9550 foot-pounds, giving a total power expended at each stroke of 32,918 foot-pounds, and this at 49 revolutions per minute would equal about 98 I.H.P. We next come to the steam cylinder, which works the compressor, and there is here the greatest room for improvement. It has usually been the practice in this country to press air with engines designed merely as winding-engines—that is to say, with steam worked all through the cylinder, and opponents of the system point to the enormous loss between the quantity of steam used in the steam cylinder with that indicated by the consuming cylinder underground, whereas a great part of this loss arises from the wasteful and wholly unnecessary plan of using steam without a cylinder expansion.

We must now calculate the size of cylinder which, when carrying steam from end to end, will develop 108 I.H.P. (this allows 10 per cent. for friction of machinery), and this will be found to be a cylinder with a piston area of 101 inches, or a diameter of about 11½ in. The quantity of steam which this will consume will be 825 cubic feet per minute. We can now compare the quantity of power developed in the steam cylinder with that given out by the consuming cylinder below, and we find out of 108 I.H.P. above, we can get only 10 I.H.P. below, showing a loss of nearly 53 per cent. I will next show how this loss may be reduced by a very moderate rate of expansion. If the steam cylinder were changed for a larger one, using steam at 30 lbs. expansively, and cutting off at half-stroke, then in order to develop the same 108 I.H.P., we should require a cylinder with a piston area of 121 square inches, or about 12 7/16ths in diameter, the quantity of steam used in this case will be 491 ft. per minute, and in this case the 392 ft. used below shows a loss of about 10 per cent. This, however, does not reach the limit of saving, for many, though not in all, collieries there is an abundant supply of water for condensing purposes, and I will take the case of a cylinder working with a condenser, and cutting off at a three-eighths stroke. In this case the effective value of the condenser shall be only 8 lbs. per square inch. In order to develop the 108 I.H.P. we should require a piston area the same as in the first case—101 in.; and the quantity of steam used will be 399 cubic feet, showing a positive gain of 27 per cent. The above results may be summarised thus:—
Steam used below (say) a loss of 10 to 20 per cent.
Steam used all through cylinder of air-press causes
a loss of 53 "
Steam cut off at half stroke causes a loss of 21 "
Steam cut off at three-eighths stroke, with condenser, will cause a gain of 27 "

The last two results would be considerably better if steam of a higher pressure were used, but I have kept to the 30 lbs. pressure in order to be within the mark. I do not intend in the limits of this paper to go into the question of the different economy to be obtained by various pressures of air, but as a general rule the lower the pressure the more economical is its production. It may be objected to the above figures that they are merely calculations which would not be borne out in actual practice, to which I would reply that although they are not absolutely correct in consequence of the operation of other causes, such as leakage and friction of pipes, yet that they are relatively true as such causes of loss are common to them all, and as I would ask when engines constructed to pump water are almost universally made to require as little fuel as possible, why economy should not be equally studied in pumping air. There is another way in which it has occurred to me that a slight economy might be effected. The temperature of air in an engine-room is always far higher than that outside, and air drawn direct from the room into the compressor is unnecessarily warm. It would be a very simple thing in setting out the foundation, to leave a passage to the open air, and by means of double covers to the compressor the air might be drawn in at a far lower temperature than is at present. Another means of reducing the temperature in the compressor, though one that might present difficulties in practice, would be to inject a small quantity of water in the form of fine spray at each delivering stroke of the piston, and I find by calculation that in the case of a cylinder 21 in. diameter by 5 ft. stroke, the small quantity of 64 cubic inches of water intimately mixed with the air would reduce the temperature of the mixture to the mean between their original temperatures; in other words, this small quantity of water at 60° when mixed with the air at 204° would produce a mixture at 132°. Although I may not have succeeded in convincing you that a saving to the extent indicated can be effected, yet I hope I have satisfactorily shown that there is immense waste going on which can be greatly reduced. If air can thus economically be pressed, its use, I think, might be extended with good results.

Underground winding is at present chiefly confined to main roads and horses and ponies employed in bringing the trams to these roads, and it would be a great thing gained if animal power could be altogether dispensed with, and machinery used in its place. One objection to the use of more machinery underground than is abso-

lutely necessary is the cost of cutting for foundations and engine-room space, and also the difficulty of getting pieces of machinery of any size into their places, and of erecting them when there. Keeping these objections in view, I have recently patented a small winding-engine intended as a substitute for horses or ponies in the workings, drawings for which are shown. The novel feature in the design is its compactness, which is chiefly obtained by passing the connecting rod between the drums, and placing the crank shaft beyond them. The frames are made of boiler plate. The cylinder in the case of the engine illustrated has a diameter of 7 in., with a 10 in. stroke, and is about six indicated horse-power, the pinion and wheel are geared in the proportion of 4 to 1, which, with a 2 ft. drum, is intended for a speed of about 3 miles per hour, and draw a load of from 3 to 5 tons up an incline of 1 in 10, according to the friction of the road, ropes, &c. The drums are loose on the shaft, and are put in and out of gear by means of a worm-wheel, and each drum is fitted with an independent break; all the handles are brought together at the rear. The engine will do the work named with about 20 lbs. of air, and I have put the pressure thus low to allow for extreme variations which always occur in consequence of several engines being sometimes used simultaneously. The extreme dimensions over all are as follows:—Length over fly-wheel to end of handles, 7 ft.; extreme breadth, under 4 ft.; extreme height, under 3 ft. 2 in.

Although not shown on the drawing, tram-wheels can be provided to take it to its place. To erect such an engine all that is required is to take it down bodily in the cage, run it on the tram-rails to its destination, and there spike it down to two timbers, and if necessary wedge it by the roof. The total weight of the engine is 28 cwt. It is hoped that by keeping down the dimensions to the lowest possible limit that this class of engine will be found a convenient and economical substitute for horses and ponies. The excavation required would not be nearly so much as for stabling for a single pony, whereas it would replace several, and by a suitable arrangement of ropes might be made to wind from several workings. Horses cost money for feeding and attendance during Sundays, holidays, and strikes, and always require a reserve in case of illness. In certain cases of accident the ventilation is often stopped, but where compressed air is used men imprisoned in a pit might by disconnecting a pipe obtain a sufficient supply of fresh air.

Horses vitiate a large quantity of air, and steam-pipes heat it, while on the other hand exhaust air increases the supply, and helps to cool the workings. New systems generally take a long time to work themselves into favour, for where a large capital has been expended owners are naturally averse to increase their outlay to alter a system. The capital required to lay down air machinery will doubtless be more than for merely carrying steam down a pit; but I believe a handsome return may be expected by the decreased cost of maintenance, when machines for winding and cutting are more generally substituted for animal power.

ROYAL CORNWALL GEOLOGICAL SOCIETY.

The annual meeting of members was held on Oct. 17, at the Museum, Penzance. Mr. WARRINGTON SMYTH, F.R.S., the president, occupied the chair, and there were among the large company present Sir John St. Aubyn, M.P., Mr. R. W. Fox, F.R.S., Mr. York (Mayor of Penzance), Dr. Le Neve Foster (Government Inspector of Mines), Messrs. W. C. Borlase, F.S.A. (secretary), C. Fox, the Rev. Prof. Hedges, the Rev. J. J. Wilkinson, Messrs. J. H. Batten, W. Bolitho (treasurer), T. S. Bolitho, E. H. Rold, T. Cornish, J. Brannwell, J. Rosser, J. H. Lev, Capt. Teague, Capt. S. H. James, Messrs. J. H. Collins, F.G.S., N. Whitley, R. Tweedy, G. Millett (curator), F. Baise, H. Grylls, Walter Borlase, Capt. Archer, Capt. Bedford, Capt. Howarth, Messrs. Lunyon, W. H. Rold, Higgs, T. B. Bolitho, Mitchell, Bettany, B. Kitto, Major, Field, and Hill. A number of ladies were also present.

The President opened his address by a feeling reference to the loss of Miss Cornish, who, alike by her intellectual power, her generosity, and her cheerful industry, had for years past in the highest degree fostered and advanced the interests of the institution. In her had been lost not only a munificent donor, but a kind friend, ever ready to volunteer counsel, or aid by work of hand or head whenever her quiet judgment suggested that they would be welcome. Few of his auditors were aware that when a large debt jeopardised the society's enjoyment of the new buildings, she undertook on easy terms to arrange for the payment of 500l. of it. As an observer in geology and natural history, and as a writer, she followed worthily in the footsteps of her father and uncle. In giving a brief biographical sketch of the late Prof. Sedgwick, an honorary member of the society, the President referred specially to the labours of the great geologist in connection with that county, and with Sir Roderick Murchison for the establishment of the Devonian system. In connection with general subjects, he remarked that their thanks were due to Mr. Bettany, jun., for the services he had rendered in connection with the arrangement of the society's fossils. But, he continued, the great object of the society was minerals. They were assembled in a district where tin mining dated back beyond tradition; where smelting works poured their blue smoke into the air, almost within sight of mines (Wheal Fortune and Wheal Vor) where steam-engines were erected half a century before Watt and his improvements—and they could not but give expression to the anxiety with which the prospects of the mines must be regarded. There had been other periods of depression and alarm which had been successfully overcome. A memorial of the "gentlemen-adventurers" in tin and copper mines in the county, dated before 1730, prayed for redress of the grievance of the excessive cost of coal, caused by the heavy duty on seaborne coal, inasmuch as it amounted to full 50 per cent. upon the amount paid to the coalowner. Who could have imagined that more than a century after this injurious tax was remitted by Parliament the mines would, in common with the whole people, be subjected to a still harsher and more cruel tax, which, with no scarcity of the article to warrant it was adding, not 50, but 100 per cent. to the ordinary price; and thereby threatening with absolute destruction a large proportion of the mines in which steam-power was indispensable. The dearth of good discoveries of tin and copper having with few exceptions been the rule for the past 20 years, had doubtless tended much to check the spirit of adventure and exploration, without which mining must gradually languish. But what a blow to absurd, because ignorant, despondency they read in the words of the memorial 140 years ago—in the statement that "the county had been so entirely tried that there was not the least reason to expect any new discovery." And yet since then Cornwall for more than a century had been at the head of the tin and copper production of the world, individual mines had been successfully worked, and entire new regions of lodes profitably opened. As for exhaustion of lode area a glance at lode maps would show the vast number of mineral veins just known, but only slightly explored, besides which they might fairly promise that numbers more were at present unknown. As to depth, no doubt increased depth of working was attended with increased expense, but they could point to lodes like those of Dolcoath and Trefroft as continuing downward with undiminished strength in the uttermost levels. And after all the depth reached, whilst nothing to the eye of the speculative geologist, was far exceeded by that of several of the European mines. He had inspected several successive workings between 410 and 470 fms. deep at the productive silver-lead mines of Příbram, in Central Bohemia, now continuing to deepen after 121 years of persistent profits. Unfortunately, however, for the western mining district of England, not only had natural difficulties to be encountered, but the coal question had to be met, and formidable rivals from various quarters introduced their easily won steam tin to the markets where Cornish tin used to reign supreme. No sooner were they somewhat released from the pressure of the East Indies than New South Wales, Queensland, Victoria, and Peru united in joint commercial attack, and now as they read in last week's *Mining Journal*, Van Diemen's Land boasted the discovery of tin ore in large quantities. Mr. Smyth quoted various reports on the Queensland discoveries, and proceeded to remark that all this was of course very disquieting. But although such reports rendered it quite certain

that a very large proportion of tin or its ore would make its way to this country, they had to remember that many of the descriptions were indited by persons not practically conversant with tin streaming or mining, and that there was sure to be exaggeration. Mr. Smyth quoted likewise a report on the tin stream district of Tennessee, which was not likely to increase its production in any material degree. After referring to the Laurium mines, the President concluded by remarking upon the issue of a fourth edition of Lyell's "Antiquities of Man," and to Mr. Borlase's "Nenia Cornubiae," a work in which the metallic element was so strong as almost to stamp it as a work of applied geology, whilst the scientific treatment of the details of the sepulchral relics of the county entitled the author to the thanks of all who were not blind to the interest of the early history of the British race.

Mr. J. H. BATTEN read the report of the Council, congratulating the society on its continued prosperity at that its 60th anniversary. The fossil room had been partially fitted with cases, and arranged by Mr. G. Bettany, jun. The library had been partly catalogued, and new cases had been ordered. Mr. C. Ross had expressed his intention to devote the 20l. due as an annuity to his aunt (Miss Elizabeth Carne) to the increase of the library. The Council deeply deplored the loss of that estimable lady. The resignation of Mr. J. H. Batten of the office of secretary was received with regret, and Mr. W. C. Borlase recommended to fill his place. The office of curator being vacated by the resignation of Mr. G. B. Millett, Dr. Le Neve Foster was recommended to fill that place, Mr. G. Bettany continuing assistant curator. The resignation of Mr. E. H. Rold, as joint librarian, was likewise accepted, and Mr. G. B. Millett appointed in his stead. The meeting was asked to elect Dr. Foster as a life member. The popularity of the museum was indicated by the fact that over 700 names had been recorded in the visitors' book during the year. The report was adopted without comment.

The TREASURER'S statement showed the financial condition of the society to have somewhat improved, the balance due to the treasurer being 11l. 17s. 2d., against 65l. 2s. 7d. last year. The receipts included a donation of 20l. toward the fossil cases from the late Miss E. Carne. The sale of vol. viii. of the Transactions brought in nearly 100l. Mr. ROLD (the librarian) said there had been no less than 15 valuable presents to that department during the year.

Mr. MILLETT (the curator) followed with his report, which duly set forth the additions made to the museum, and the work done therein during the year. It was intended to prepare a list of desiderata in the mineral collection, and the publication of a guide-book to the museum was recommended.

Mr. T. CORNISH read a paper describing the sections of pits sunk in the Western Green, near Newlyn. Under the natural "country" was a layer of peat, with quartz pebbles. Beneath that a layer of elvan stones closely packed on a bed of clay. Amongst these stones was a large piece of flint. The clay bed was very tough. Beneath that was a thin bed of sand, and then the clay again. In the peat in one pit small pieces of wood were found and flag leaves.—The President thought that the elvan floor spoken of led them to consider whether ice had not played its part in producing the phenomenon.

Mr. N. WHITLEY followed with some remarks on "Glacial Action in North Devon," traces of which he believed he had discovered in the valley of the Taw. He had found the upturned carboniferous rocks planed down as if by some great natural plane, and capped by a body of pebbles, consisting of rocks of the neighbourhood, some granite, and some chalk flints. This occurred about three miles from Barnstaple, on the line of railway; at Fremington Point, and near Westward Ho! Still more striking was his discovery in a quarry at Bickling of similar indications; and of what he took to be the boulder clay at Heaton Court. It was rather remarkable that a number of ovoid boulders were lying in the clay on their points.

Dr. LE NEVE FOSTER, who was called upon by the President, said he should like to see the sections before he pronounced a definite opinion. The two upper sections shown by Mr. Whitley reminded him more of river gravel than of glacial drift. The third was certainly very unlike the river gravel he had seen except in one case. Perhaps the bed had been deposited horizontally, and the position of the pebbles afterwards altered by the squeezing of an iceberg.

Mr. J. H. COLLINS had often been struck by the fact that the peculiar curve shown by most of the hills of Cornwall was like the curve produced by the action of a sheet of ice. Latterly he had examined a great many iron lodes, the upper portions of which he had always found bent over in a direction down the hill—whether by ice or not he could not say.—Mr. WHITLEY had noticed the pebbles arranged upright at St. Achuel.—The President hoped attention would be directed to this subject as one of peculiar interest.

Dr. LE NEVE FOSTER read some interesting notes on some specimens of minerals which he presented to the museum to fill up gaps in its series.

The President said too much attention could not be paid to local minerals; and they were all deeply indebted to Dr. Foster for his hints and presentation. He specially called attention to the importance, both commercially and scientifically, of the works of the Perran lodes.

Mr. TWEEDIE enquired whether the increased production of iron would not compensate for the falling off of tin and copper. Mr. COLLINS declined to predict, but said that anyone who wished to see what was being done at Perran would be welcome. They had, however, at Perran, a lode of more than four miles in length, averaging more than 20 ft. wide, and proved to 30 or 40 fathoms. Then there were scores of other lodes. It was common for Cornishmen to say that the iron would fail in depth. If it did, however, they would have something else below.

Mr. T. J. BOLITHO did not believe, with Mr. Tweedy, that the day was coming when Cornwall would cease to be a tin and copper country. The tin mines had struggled through difficulties before, and would again. They wanted improved machinery, and he did not doubt the increased price of coals would tend in the end to great economy. He should like to know how the deep Bohemian mines were ventilated.

The President held the same conclusions as Mr. Bolitho, whose remarks must be exceedingly satisfactory to the country. In the Bohemian mines the ores were raised in cages by wire ropes, worked by horizontal engines. The water was not heavy, and the ventilation was uncommonly good. In fact, he could hardly believe he was at the depth he was.

The meeting then proceeded to the election of the officers of the society. On the nomination of Sir JOHN ST. AUBYN and Mr. T. S. BOLITHO, Mr. WARRINGTON SMYTH was re-elected president. Viscount Falkmouth, Mr. H. S. Tremereere, Mr. Le Grice, and Mr. A. P. Vivian, M.P., were chosen vice-presidents. The council were likewise chosen, and the officers as already stated—most being re-elected. The proceedings then closed.

After the meeting the president and Mrs. W. Warrington Smyth gave a *recherche* luncheon at Blackwell's Queen's Hotel. About 70 ladies and gentlemen sat down, under the presidency of Sir John St. Aubyn, M.P. The usual toasts were given, and the health of the president and Mrs. Smyth, to which Mr. Smyth replied. Mr. T. S. Bolitho then, in the name of the Geological Society, invited the president and Mrs. Smyth to dine with the united members of the society in 1874, which was cordially accepted.

SINGULAR ACCIDENT, AND EXTRAORDINARY CURE.—On Saturday afternoon an accident, which was nearly proving fatal, happened to a man named Adam Drewe, employed at the ironworks, Seem, near Melksham. It appears that the large iron tube, about 30 ft. in circumference, through which hot air is blown from the engine, sometimes gets obstructed by ashes, and then a man has to creep into it for the purpose of removing them. This was the case on Saturday, and Drewe, who is a powerfully built man, got in to the tube for the above purpose. Not making his re-appearance, a man was sent into the tube to search for him, and found him jammed in a narrow part of the tube in an insensible state. After some difficulty he was pulled out, still insensible, with several scars and burns on his body. Now comes the most extraordinary part of the story—the Staffordshire mode of bringing him to life, and it was as follows:—A hole was dug in the ground large enough to receive Drewe's head, and into this hole his head was put, face downwards, and carefully covered up in the "mother earth," with the exception of a small hole left when breathing time came. Wonderful to relate, there were soon signs of returning life, and Drewe was recovered as to "unearth" himself. Brandy was administered to him, and he was soon himself again.—*Bristol Daily Post*.

LONDON GENERAL OMNIBUS COMPANY.—Traffic receipts for the week ending Oct. 19, 1873, 12s. 4d.

Meetings of Public Companies.

BLUE TENT CONSOLIDATED HYDRAULIC GOLD MINES COMPANY.

The statutory meeting of shareholders was held at the offices, Austinfrans, on Monday.

Mr. J. IRVING COURTNEY in the chair.

Mr. W. J. LIVINGSTON (the secretary) read the notice convening the meeting.

The CHAIRMAN said,—"You are aware, Gentlemen, that this is the statutory meeting, necessarily held within four months of the incorporation of the company. As some of you may not have read the elaborate reports of Prof. Silliman and Mr. McLean with the care they deserve, I think it will not be a waste of time to tell you what the property consists of, and the special advantages it possesses. The Blue Tent property is about five miles from Nevada City, California, and is a consolidation of several smaller properties contiguous to each other, formerly belonging to a number of persons, but now all owned by the company—forming a compact mass of auriferous gravel, 490 acres in extent, and lying, so to say, in a "ring fence." It is situated upon the south bank of the South Yuba river, and extends upon the channel for over a mile, with an average depth of 300 ft. to 400 ft., though in places it is 1000 ft. in thickness—the whole being within the limits of the Great Blue Lead of California. The gross value of the gold disseminated throughout this mass of alluvium is estimated at 12,000,000, sterling; and I would here refer those of you who are interested in such calculations to Prof. Silliman's report, which contains the data upon which the estimate is based—and when you grasp the startling fact that an area of 50 miles in width and 300 miles in length is extensively covered by these auriferous deposits, you will appreciate the force of the learned Professor's remarks in a lecture on this subject, delivered at the Cooper Union, New York, in March, when he said—"So far from the supply of California being exhausted, we have only picked up the loose gold that the secondary distribution of the old placers left in the stream, and we have not touched upon the great mass of treasure which lies locked up in these great safes." Possessing, then, an inexhaustible supply of alluvium upon which to work, enough to last a century or longer, what else is requisite? There are two essentials—water and an outlet for the debris when washed down by the water—one of which is already, and the other will be shortly, possessed by this company in an eminent degree. There are two aqueducts or ditches in use on the property; the reservoirs attached to them are now being enlarged, so as to utilise to the utmost our supply of free water. The valuable water franchise possessed by the company—the right to take water from the South Yuba river—will be speedily made use of—the aqueduct we propose to construct will be some 20 miles in length, with a capacity of 3000 miners' inches of water per diem. Work is in progress on this; the head dam is finished, and it is expected the three spring months will complete it—meanwhile Colonel Tozer, the company's superintendent, has entered into favourable arrangements with the South Yuba Canal Company for a supply of water. This is one of those companies whose chief business is to sell water for mining purposes; the profitable nature of the trade may be inferred from the fact that \$20,000,000 have been spent in building aqueducts in California. The South Yuba Company are increasing the size and repairing that portion of their system which supplies Blue Tent; and, if they will supply us with water at reasonable rates, they may rely upon our being regular customers—for so vast is our property that we can find profitable use for a much larger quantity of water than the proposed aqueduct will give us. Now, as to the outlets or approaches to the property. It is evident to anyone studying the processes of hydraulic mining that where such enormous masses of gravel—hills, in fact, of no mean dimensions—are displaced by the action of water, outlets of corresponding size must be found for them. Such outlets exist to a remarkable extent on the Blue Tent property. Nature has provided deep ravines and gorges, through which it is easy to carry off the gravel, and former proprietors have driven bed-rock tunnels to a considerable length, so that we have not (as is the case with other companies) to run bed-rock tunnels requiring years to complete. We are now making rapid progress with a bed-rock tunnel on the claim called the South Yuba, of which there remains less than 200 ft. to complete. This tunnel will give an opening into the bottom of the channel, where invariably the richest dirt is found. You have only to look for a proof of this at what that successful company Sweetland Creek did in their first run, working on the channel through the new tunnel. They made, I think, a profit about 7000, in ninety days. The contract price for the Yuba bed-rock tunnel is \$20 per foot, and the contractors are making 40 ft. per month. It is estimated that \$30,000 will be taken out of this washing alone next season. Mr. McLean, in his report, said a tunnel from Cody Ravine 500 ft. long would be sufficient to wash out nearly every claim on the property, and when we know that other companies, both American and English, have been engaged for years making tunnels thousands of feet in length, the unrivalled facilities of Blue Tent in this respect become manifest. A working tunnel through gravel is also being driven on Enterprise claim, in which a new flume will be placed, and some undercurrents will be added, to prevent the loss of quicksilver. We have appointed Colonel C. W. Tozer superintendent of the property. He is deeply interested in its prosperity, and I feel sure he will strain every nerve to make Blue Tent a brilliant success. You know Mr. Bowe has gone out to consult with Col. Tozer as to the construction of the ditch, and generally to assist in putting the property into working order for the coming water season. And now, Gentlemen, a few words as to the profits we hope to make, though I have no doubt that part of the reports which treated of the net yield was studied by you all. The experience of years has shown that in average gravel washings the profits may be safely calculated at 30 cents per inch of water, or (say) 60¢ for each 1000 miners' inches of water used for 24 hours. Upon this basis the profits in Blue Tent, when in full working order, are estimated from 35000, up to 50000, a month for eight months in the year. We shall be ready for the water by Nov. 15, and running a large quantity of water immediately, our profits will be considerable; but, of course, will be greatly increased when we have the additional supply of water from our own ditch. It will be our aim to build this as quickly as circumstances permit, and vigorously, but with judgment, to develop the resources of this immense property, and I trust, with good management on the spot, we may ere long show by results the truth of the saying that Blue Tent, "considered in its entirety, the facility of its approaches, and the water which is now or can be brought to bear upon it, is without a rival in California." I shall be glad to give any further information I possess, and hope I have not wearied you while endeavouring to make you acquainted with the value of the property, for the auriferous deposits or "dead rivers" of California—so interesting in their geological aspect—and the method known as the "hydraulic process," by which they are compelled to yield up the precious metal, are as yet little understood in this country, though they are gradually attracting the attention they merit, and hydraulic companies will steadily grow in public estimation when they are observed to pay year by year regular and increasing dividends.

Mr. GEORGE BATTERS said the telegram referred to by the Chairman was confirmatory of what Mr. Bowe had informed him by letter. They hardly expected that the company's own ditch could have been completed at the end of the three spring months of next year—indeed, it was hardly expected water would be running in their own aqueduct before the winter after this. It appeared, however, from the new survey the work will be lighter, and much more easily accomplished than they had been led to expect. He thought the Chairman had under rather than over estimated the profits that might be expected to be realised when the company was running its own water, over and above what could be obtained from the South Yuba river.

The CHAIRMAN said he took the minimum at 35000, per month, the maximum being considerably over 50000.

Mr. G. BATTERS said that, judging by what they were doing in Sweetland Creek, he certainly thought shareholders in Blue Tent might expect a much better result when the aqueduct had been completed. He saw no reason why very large profit should not be made during the coming water season, which they were now about entering upon. He should like to know what amount of profit it was calculated would be realised by the purchase of water from the South Yuba Company?

The CHAIRMAN said they would run about 3000 in. of water; but it was proposed

to run with their own water and buy as well—therefore, they were perfectly safe in making the estimate referred to. Mr. BATTERS saw no reason why they should not run 5000 inches of water, in which case they ought to realise nearly double the amount of profits estimated; and, possessing nearly 500 acres of gravel deposit, of an average thickness of nearly 300 ft., he could not see why, however extensive the scale of operations, but a small impression could be made upon it in the present generation, and the larger the operations the greater would be the profits. He considered the Blue Tent one of the best hydraulic properties that had been introduced into this market, and they had before them a great and prosperous future—it compared favourably with any, both for facilities of working as well as richness of the gravel.

A SHAREHOLDER enquired the actual amount of gold that had been taken out of the property?—The CHAIRMAN said it was not very easy to say, because the property had been worked in a desultory manner by a number of small owners. Both Prof. Silliman and Mr. McLean took great pains to ascertain this fact accurately, but there were difficulties in getting the necessary data; Prof. Silliman, in his calculations, estimates a certain amount—10 to 30 cents—per yard, but states that it is more desirable to estimate by the amount of water. It appears the gross value of the water was as nearly as possible 50 cents per inch, but he has valued it at 30 cents, which was the figure he (the Chairman) had taken in his estimates. Mr. McLean's estimates were somewhat similar. The gravel, they were informed, is as rich as any in the neighbourhood, and such as had been washed off was only the "top dirt," so that when the bed rock tunnel was working on the channel gravel it would be a great deal richer than that washed off by former owners.

Mr. BATTERS understood the bed-rock tunnel was now of sufficient length to commence working through this coming water season. The CHAIRMAN said that in January or February they expected to be able to wash down to the bed rock. A SHAREHOLDER said it was satisfactory to find that while these important works were being carried out profitable returns were expected to be realised.

The CHAIRMAN said that, having made favourable arrangements with the South Yuba Company, he could not see why dividends should not be commenced to be paid as soon as they began work. He mentioned that they were going to purchase the water at a much less rate than estimated, and, therefore, the profits would be much larger.

The SECRETARY, in reply to a question, stated that the Chairman had estimated they would have 3500 in. of water for eight months, while Mr. McLean reckoned it would last for ten months, and since that they had arranged with the South Yuba. The CHAIRMAN said that all the hydraulic companies—at any rate, all with which he was acquainted—had paid steady dividends.

A unanimous vote of thanks was passed to the Chairman and directors. The CHAIRMAN acknowledged the vote on behalf of the board and himself, and could only say that he hoped before he next had the honour of addressing the shareholders dividend warrants would have been sent out. (Hear, hear.) The meeting then separated.

WICKLOW COPPER MINE COMPANY.

The half-yearly meeting of shareholders was held at the offices of the company, Grafton-street, Dublin, on Oct. 17.

Mr. R. KELLY (Chairman of the directors) in the chair.

There was a very full attendance of shareholders. The notice convening the meeting having been read by the SECRETARY, the seal of the company was affixed to the registry of shareholders. The report of the directors was published in last week's Journal.

The CHAIRMAN then proposed the adoption of the report in a speech of considerable length, in which he referred to the accounts, the closing of the Arklow Mining Company and dismissal of the men, and stated the recommendation of the directors that the shareholders should dispose of this portion of their property as soon as possible to the best advantage. He then stated the progress that had been made at the works at Ovea, and showed that they were in a flourishing condition, and were likely to yield a large profit to the company when they should have completed arrangements—which they are negotiating—to have their goods shipped from Kingston. Having referred to the work done by the liquidators, he proposed the adoption of the report, which was seconded by Mr. THOS. WORTHINGTON.

Mr. WALSH took exception to the accounts, and proposed, as an amendment, that a committee be appointed to examine the accounts, and report to the shareholders. The amendment was seconded by Mr. LITTLEDALE.

After a protracted conversation about the use of proxies, which the CHAIRMAN said they had in hand and were determined to use, a division was taken. The CHAIRMAN declared the result of the division to be as follows, without proxies—125 shares present, representing 325 votes, had voted against the reception of the report; 2708 shares, representing 593 votes, voted for the reception of the report. He, therefore, declared it to be adopted. In addition there were 600 proxy votes in favour of the directors, which they did not mean to use.

Dr. Edward P. Wright and Mr. Brindley Hone were re-elected directors. A resolution authorising the directors to dispose of the Arklow Chemical Works and plant, as recommended in the report, was carried.

Mr. John Walsh was elected auditor. A resolution fixing the remuneration of the auditor at 50s. for each audit was carried. Mr. Walsh afterwards said he would not act.

Thanks having been voted to the Chairman, the proceedings terminated.

BEDFORD CONSOLS MINING COMPANY.

A general meeting of shareholders was held at the company's offices, Old Broad-street, on Wednesday.

Mr. KIRKPATRICK in the chair.

Mr. ROBERT ROWELL (the secretary) read the notice convening the meeting.

The accounts, with everything charged up to date—to last month's pay, including all merchants' bills, and every liability—showed a balance of 370, 10s. in favour of the mine; this does not include an asset some 20 tons of ore ready for sale. The agents' report was read, as follows:—

Oct. 21.—We beg to hand you the following report of this mine, showing the principal amount of work accomplished during the past four months, and the present position of your property. The 57 has been extended west from the engine-shaft 13 fms. 6 ft. 4 in. on the course of the lode, which is found to vary in size from 3 ft. wide, and in places of a most promising description, yielding very strong mounds, intermixed with pebbles, friable spar, and good quality yellow copper ore. The lode in the end is 4 ft. wide, of the same character as described above, and within a short distance of the junction. In the bottom of the 57, some 23 fms. west from shaft, a trial winze has been sunk some short depth, and a small portion of the ground stopped away, where we find the lode going down the 57, and likely to strike a considerable quantity of ore in a few fathoms further driving. To carry out this proposed work will incur a cost of about 80, per month.—GEORGE ROWE, JOSEPH MITCHELL.

The CHAIRMAN said: The present state of affairs shows considerable improvement, fully carrying out the views expressed at the last meeting. The bottom of the trial winze is in rich ground, and has yielded upwards of 20 tons of rich quality ore; and as soon as the water is drained by the direct winze now sinking for this purpose, stopping can be re-commenced with every prospect of good paying results. With the above balance in hand, and with the further asset of copper ore stocked, there is sufficient money in hand to carry on the proposed operations for the next four months, by which time the 79 will have been reached, and the present sheet of ore in the trial winze driven under and drained. This will probably make the monetary position of the mine still more satisfactory, and as the junction in the 57 will also have been reached, the prospects of the mine are decidedly good.

The proceedings terminated with the usual vote of thanks to the Chairman.

WEST TOLGUS MINING COMPANY.

At a general meeting of shareholders, held at the mine, Mr. JOHN HAVE (the purser) presiding, the accounts presented showed—To labour costs for July and August, 1549s.; merchants' bills, 1077s.; portable steam engine, 275s.; on account, 12th month, 150s.; and going down in a fine piece of ground. The cost for the account has been 275s., very nearly the amount estimated at the last meeting; in addition to this has been charged 275s. for balance of purchase-money of the new engine. The underground prospects of the mine are quite as good as they were at the last meeting; we still labour under the disadvantage of a very low price for copper ore.

WHEAT OWLES.—At the meeting, on Oct. 17, the accounts for the 12 weeks ending Aug. 14 showed a credit balance of 1145s. 12s. 11d. During the quarter 82 fms. 3 ft. 2 in. were driven in levels, and 58 fms. 4 ft. 4 in. sunk in shafts and winzes—146 fms. 1 ft. 6 in. There were 43 boxes of men stopping for tin on network, and 14 pieces working on tribute. The purser having suggested the advisability of steepling the tin, it was resolved to leave the matter to his discretion. The profit on the three months' working was 267, 2s. 6d. Looking at the enormous condition of mining in the neighbourhood of the mine and the country at large, it is somewhat satisfactory that they are able to meet cost. Since the last meeting the price of tin ore has risen 4d. per ton more, and this, with a high labour market and dear materials, is shutting up a great number of mines. It will be observed that they purpose holding tin for the present, and it is to be hoped they may be as successful as on a former occasion. In the new part on the Cliff they are sinking the Wheat Edward diagonal shaft under the old men's bottom level (the 80), and a winze also, both of which are opening paying tin ground; this shaft is now 145 fms. deep. The West Wheat Owles diagonal shaft has been sunk 10 fms. since

the last meeting; this shaft is now 123 fms. deep from the brow of the Cliff, and about 26 fms. perpendicular depth under the bed of the sea. They are engaged in fixing their engine work, which, when completed, will enable them to once to cut through the lode, and drive east and west to search for mineral. The prospects of the mine, as a whole, have not improved since last account.

MARBELLA IRON ORE.—At the extraordinary general meeting (Mr. George Anderson, M.P., in the chair) it was explained that the object of the meeting was to pass a special resolution respecting the dispute between the company and the trustees of the estate of Messrs. Malcom. The proceedings were a purely formal character, the details of the arrangement having been fully discussed and agreed to at a previous general meeting. Only three shareholders besides the directors were present, but as five constitute a quorum the meeting was quite in order. The present meeting had to be held because the resolution was required verbal amendments to ensure its intention being carried out, to accept the fact that the amended form should be sanctioned by the shareholders. The resolution now reads—"That the 23rd Article of the Company's Articles of Association be, and it is hereby, modified by adding thereto the following words:—'But it shall nevertheless be lawful for the directors of the company for the time being, or any of them, or any interest therein on behalf of the company, and generally upon such terms as the directors shall approve of, and to cancel or otherwise deal with such shares' interests therein, when so surrendered or purchased, in such manner as may be determined by a general meeting of shareholders summoned for the purpose." Mr. Grey opposed the resolution and proposed an amendment, because he did not have confidence in the business capacity of the proposed trustees, Geo. 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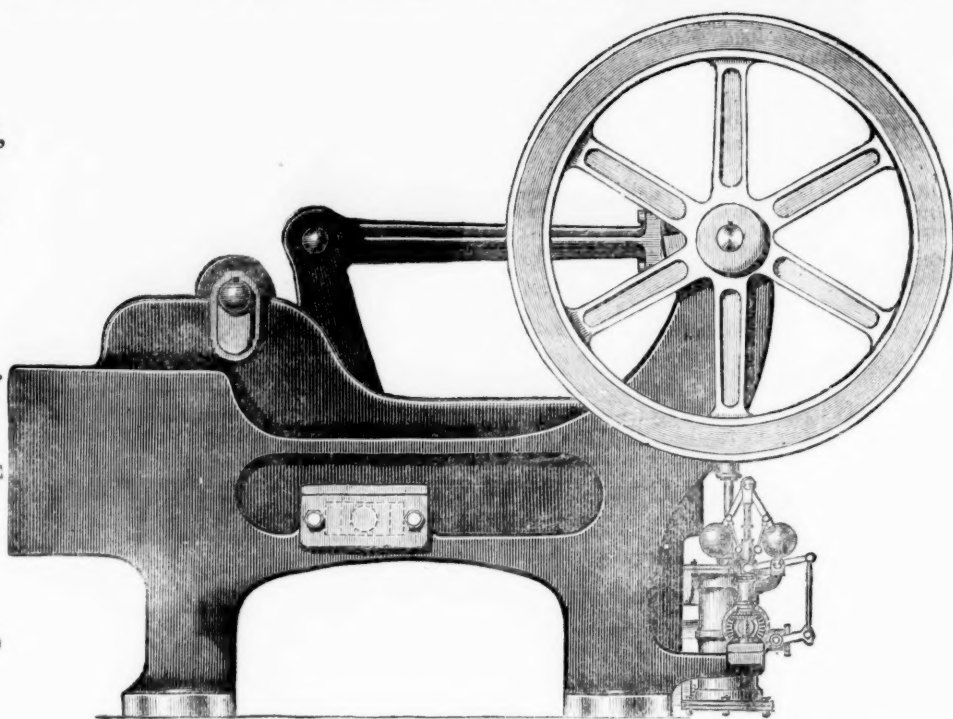
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in the same number of months, and sample cores are brought up, showing the nature of the strata passed through, and enabling the
minerals obtained to be analysed.

The company has a number of MACHINES in SUCCESSFUL OPERATION in different parts of ENGLAND, and the terms,
with particulars, will be supplied upon application to—

**THE SECRETARY, DIAMOND ROCK BORING COMPANY, LIMITED,
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BOLTS AND NUTS. BOLTS AND NUTS.

MADE BY PATENT MACHINERY.

Suitable for Engineers, Millwrights, Coach and Wagon Builders, Colliery, and other Purposes.

AN EXTENSIVE ASSORTMENT OF OVER 200 TONS ALWAYS IN STOCK.

From which orders can be promptly executed. Every description of Bolts and Nuts made to order.

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OVER 1000 TONS OF BARS, PLATES, SHEETS, ANGLES, HOOPS, SQUARES, ROUNDS, AND FLATS.

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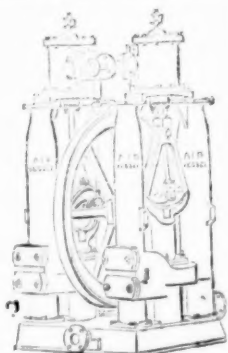
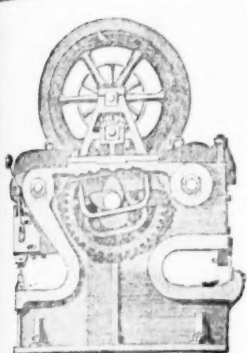
**JOHN STANSFELD (late Stansfeld and Sons), Iron Merchants, Bolt
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**THOMAS WARDEN & SON,
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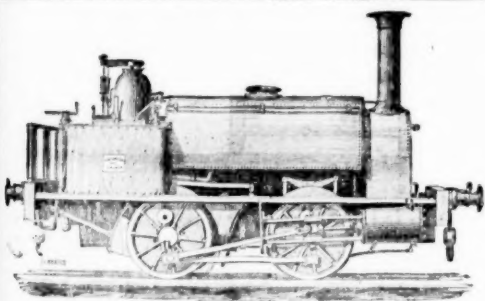
A LARGE STOCK OF SECOND HAND RAILS AND PLANT ALWAYS ON HAND.



JOHN CAMERON,

MAKER OF

STEAM PUMPS, PORTABLE ENGINES, PLATE BENDING ROLLERS
BAR AND ANGLE IRON SHEARS, PUNCHING AND SHEARING
MACHINES, PATENT OF THE DOUBLE CAM LEVER
PUNCHING MACHINE, BAR SHEARS, AND RAIL
PUNCHING MACHINES,
EGERTON STREET IRON WORKS,
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TANK LOCOMOTIVES,

FOR SALE OR HIRE.

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MANUFACTURERS OF EVERY DESCRIPTION OF
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from the very best quality of charcoal iron and steel wire.

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GERMAN STEEL,

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Springs and Buffers.

SHEAF WORKS AND SPRING WORKS, SHEFFIELD.

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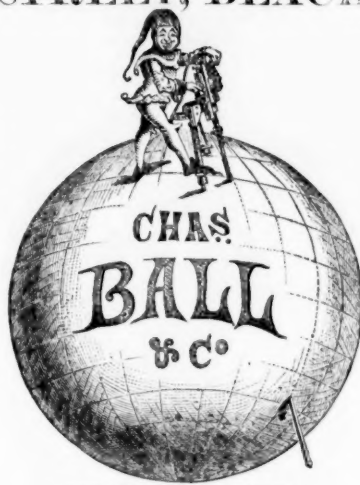
Where the largest stock of steel, files, tools, &c., may be selected from.

CHARLES BALL AND CO.,

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ROCK DRILLS.

- A**—This machine is specially adapted for driving levels, adits, or tunnels. It works without concussion, and therefore does not wear out. Has driven in granite 53 yards of drift in one month, where hand labour could only progress 8 yards in the same time. Forty-four of these machines are at work in a single colliery.
- B**—This machine is the latest out; it is self-acting, self-feeding, self-stopping. It has fewer parts than any other drills, and its simplicity is remarkable. It is specially adapted for sinking and vertical work.
- C**—Self-acting and self-feeding, very light and handy, suited for general work, and for quarry work, especially on account of its very small dimensions and lightness.
- D**—Hand drill for soft material.
- E**—Drills of other systems are also in stock, and can be supplied, if desired.



REGISTERED TRADE MARK.

AIR COMPRESSORS.

- A**—DRY SYSTEM—cheap and simple—six sizes.
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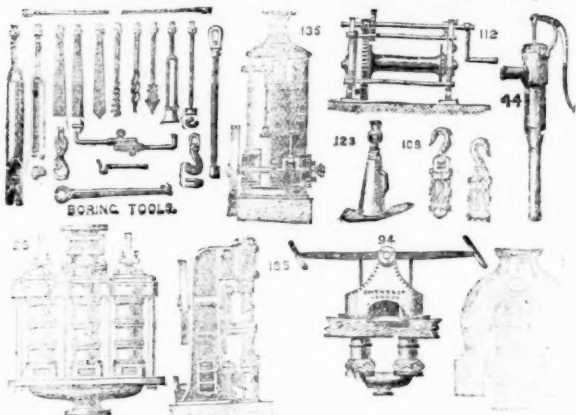
SMALL BOILERS, for working Rock Drills, from 4 to 12-horse power, generally in stock.

ANY LARGER SIZE TO ORDER.

PUMPS, STONE BREAKERS, WINDING ENGINES, &c.

Messrs. CHARLES BALL and Co., in consequence of their long experience in Rock Drilling, both in England and on the Continent, are prepared to advise professionally as to the best methods for driving and sinking according to nature of rock and local circumstances.

S. OWENS AND CO.,
Hydraulic and General Engineers,
WHITEFRIARS STREET, FLEET STREET, LONDON
AND AT
195, BUCHANAN STREET, GLASGOW (W. HUME, AGENT).



BORING TOOLS, for testing ground for Minerals. Bridge foundations, Artesian Wells, &c., to any depth.

No. 26.—Treble Barrel and other Deep Well Pumps.

No. 134.—Vertical and other Portable Steam Engines.

No. 155.—Horizontal and Vertical Steam Pumping Engines.

No. 112.—Single and Double-purchase Crab Winches.

No. 108.—Pulley Blocks of all sizes.

No. 123.—Bottle and other Lifting Jacks.

No. 94.—Double-barrel Pumps, for Mine or Quarry use.

No. 44.—Portable Wrought-iron Pumps, ditto ditto.

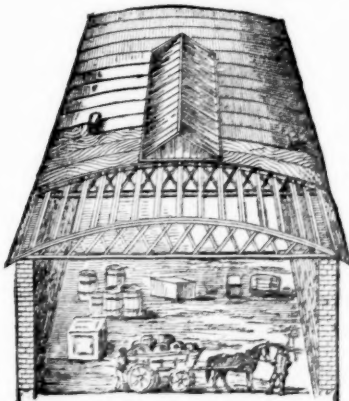
No. 102.—Barnay's Patent Centrifugal Pumps, of all sizes.

ALSO EVERY OTHER DESCRIPTION OF
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COMPRISING

**TURBINES, WATER WHEELS, WIND ENGINES,
THE HYDRAULIC RAM, FIRE ENGINES, &c.**

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M'TEAR AND CO.'S CIRCULAR ROOFING FELT,



FOR
GREAT ECONOMY
AND
CLEAR WIDE SPACE.

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BELFAST.

The above drawing shows the construction of this cheap and handsome roof, now much used for covering factories, stores, sheds, farm buildings, &c., the principal of which are double base and string girders of best pine timber, shod with 12 in. boards, supported on the girders by pulleys running longitudinally, the whole being covered with patent waterproof roofing felt. These roofs so combine lightness with strength that they can be constructed up to 100 ft. span without centre supports, thus not only affording a clear wide space, but effecting a great saving both in the cost of roof and uprights.

They can be made with or without top lights, ventilators, &c. Felt roofs of any description executed in accordance with plans. Prices for plain roofs from 30s. to 50s. per square, according to span, size, and situation.

Manufacturers of **PATENT FELTED SHEATHING**, for covering ships' bottoms under copper or zinc.

IMPERVIOUS FELT for lining damp walls and under floor cloths.

DRY HARK FELT, for deadening sound and for covering steam pipes, thereby saving 25 per cent. in fuel by preventing the radiation of heat.

PATENT ASPHALTE ROOFING FELT, price 1d. per square foot.

Wholesale buyers and exporters allowed liberal discounts.

PATENT ROOFING VARNISH, in boxes from 3 gallons to any quantity required 8d. per gallon.

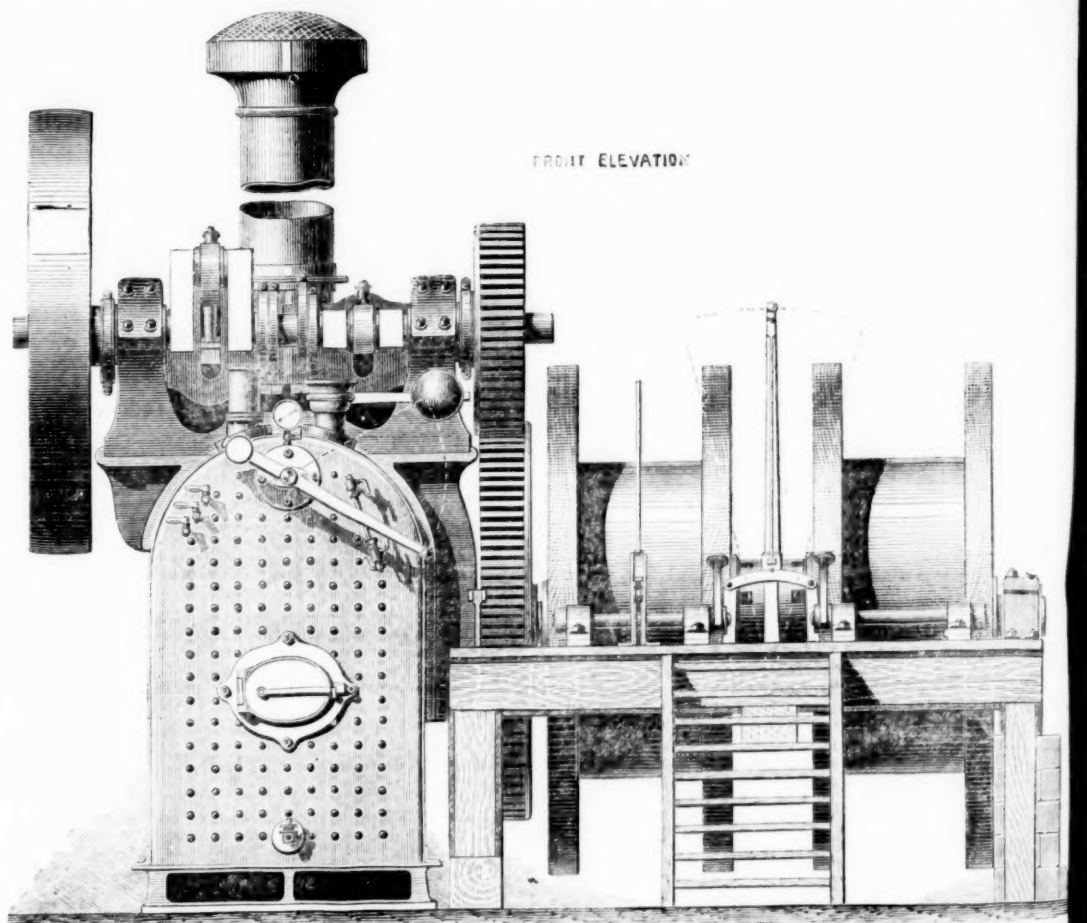
THE DON LUBRICATING OIL
IS 40 PER CENT. CHEAPER THAN ORDINARY KINDS,
AND QUITE AS GOOD AND DURABLE.

It is absolutely free from the very common defect of gumming.
Mr. HEWLETT, of the Wigan Coal and Iron Company, says:—"I have used it for two years, and find it to answer exceedingly well for lubricating purposes."
Trials may be made at our risk.

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THE ROBEY MINING ENGINE.



FRONT ELEVATION

FROM 20 TO 200 EFFECTIVE HORSE-POWER.

FOR FULL PARTICULARS AND PRICES, APPLY TO—

ROBEY AND COMPANY, LIMITED,
PERSEVERANCE IRONWORKS, LINCOLN.

ALSO OF PATENT PORTABLE

HAULING & WINDING ENGINE

WITH
PATENT DRUM WINDLASSES,
FOR MINING PURPOSES.

This Engine is specially commended to Mining Engineers and others, as by its adoption—Haulage along inclined drifts is easily and cheaply effected; The expense of sinking new shafts is greatly reduced, neither foundations nor engine-house being required; It is available not only for winding, but for pumping, sawing, &c.—a great desideratum at a large colliery; It can be very quickly removed (being self-propelling), and fixed in any desired position. Prices and full particulars on application as above, and also references to view the engine in successful work near Derby, Cannock, Haverfordwest, Darlington, Durham, Penzance, and other places.

THESE ENGINES WORK WITH MARVELLOUS ECONOMY IN FUEL.

CHAS. PRICE AND CO.'S RANGOON ENGINE OIL, AS SUPPLIED TO H.M. DOCKYARDS AND FLEET.



THIS OIL is suitable to every kind of Machinery. As a lubricant it is equal to the best Spermaceti or Lard Oil, while it possesses the great advantage of being entirely free from any principle which will corrode the metal bearings.

For particular kinds of Machinery, the Oil may be specially prepared of a consistency and character adapted to the nature of the work to be done.

"I herewith certify that the Rangoon Engine Oil, manufactured by Messrs. Chas. Price and Co., is free from any material which can produce corrosion of the metal work of machinery. It is calculated to protect metallic surfaces from oxidation."

"The lubricating power of this oil is equal to Spermaceti or Lard Oil."

"T. W. KEATES, F.C.S., &c."

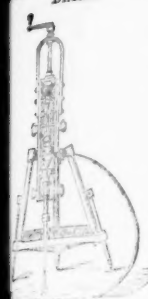
Every parcel of the Oil sent from the works bears the Trade Mark of the Firm.

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WORKS: MILLWALL, POPLAR; and ERITH, KENT

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THOMAS BROWN,
PATENTEE AND SOLE PROPRIETOR.

THE "BURLEIGH" ROCK
DRILL.



This celebrated ROCK DRILL, which by reason of its inherent merits has superseded all other Rock Drills, is now in extensive use in America, England, Scotland, and the Continent, and is indispensable in the economic working of all Railway Cuttings, Shafts, Quarries, and Mines.

Its prominent features are:—

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Any labourer can work it, and it does not get out of order. It may be worked either by air or steam power, at will, without any alteration of the mechanism.

II.—ITS DURABILITY.

No part of the mechanism is exposed; it is all enclosed within the cylinder—so there is no risk of its being broken.

III.—ITS CAPABILITY.

In hard rock, like granite, gneiss, iron-stone, quartz, the Tunnel Drill will progress at the incredible rate of 12 inches to 12 inches per minute. These machines can bore holes 1 inch up to 5 inches in diameter, and, on an average, will go through 120 feet of rock per day—making 40 holes each from 2 to 12 feet deep. The drill can be used at any angle, and in any direction, and will drill and clear itself to any depth up to 20 feet.

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As compared with hand labour the saving in actual drilling is very considerable, from the fact of the "out put" being increased tenfold. The saving in the general expenses, and in the interest of capital, will be in a like ratio.

DRILL POINTS.

The saving in steel alone is incredible, ONE DRILL POINT WILL GO THROUGH TWENTY FEET OF ABERDEEN GRANITE WITHOUT SHARPENING. This fact will be duly appreciated by practical men.

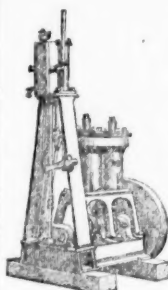
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WILSON, McLAY, & CO., Sole Agents, 2, Talbot-court, Gracechurch-street, London, E.C.; and 87, St. Vincent-street, Glasgow.

CRIVEN BROTHERS, Engineers (the Makers), Vauxhall Ironworks, Osborne-street, Manchester.

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AIR COMPRESSOR,
THOMAS BROWN
PATENTEE & SOLE PROPRIETOR.



For driving the "Burleigh" Drill, or other Machinery.

The peculiar advantages which enhance the value of this Machine in the estimation of those who have it in practical use are—

1.—The pump pistons are driven by a steam-engine, the connection rods being attached to one crank shaft, the angles being so set that when the greatest power is developed in the steam cylinder the point of the greatest compression is being reached alternately in the air cylinders.

2.—The heat generated by compression of the air is reduced to nil.

3.—It is strong and durable compared with its effective power.

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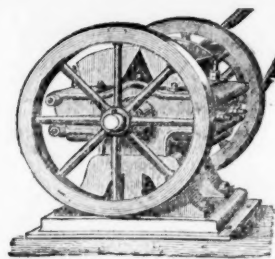
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THE MAKERS,

VAUXHALL IRON WORKS, OSBORNE STREET, MANCHESTER.



Machine No. 1.—The Direct Double-Action.

IMPROVED

**PATENT STONE BREAKING,
QUARTZ CRUSHING,
AND GRINDING MACHINERY.**

Messrs. T. BROWN and Co., ENGINEERS, have much pleasure in calling attention to their IMPROVED MACHINERY for STONE BREAKING and QUARTZ CRUSHING, for crushing, grinding, or triturating Stone, Flint, Minerals, Ores, Chemicals, and other substances; for washing and separating Metals from Ores, and for extracting Gold from Quartz.

The principle of this invention is applied to machines of various construction, which contain within the range of their capability the power of reducing all hard materials to cubes of from 2½ inches to impalpable powder. The mechanical construction of each description of machine is specially adapted for its own peculiar work, and experience has shown that each is eminently suited for the work for which it is designed.

They can be driven by water, steam, or horse power; they are light and portable, and their crushing and grinding surfaces are so constructed that when worn they can easily be replaced.

If intending purchasers would send a sample of the materials required to be crushed or broken it could be operated upon in their presence, and thus they would be guided in the selection of the machine best suited for their requirements.

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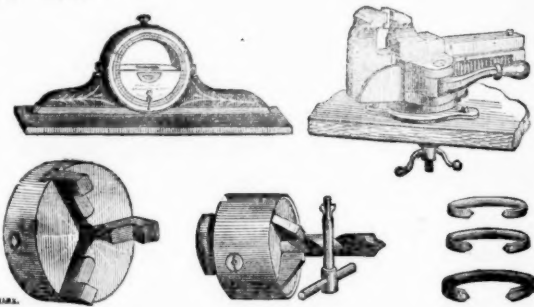
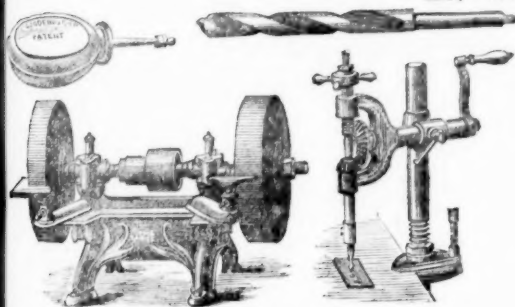
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IMPORTERS AND FACTORS OF AMERICAN MACHINERY AND TOOLS,
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C. C. and Co. are prepared to give quotations and execute orders for American Goods of all descriptions, to be shipped to any port.

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Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.
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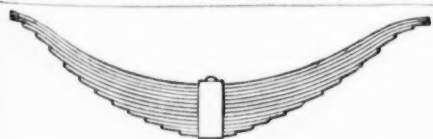


A special method of preparation, this leather is made solid, perfectly close in grain, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

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THE HIGHEST PRIZE AWARDED

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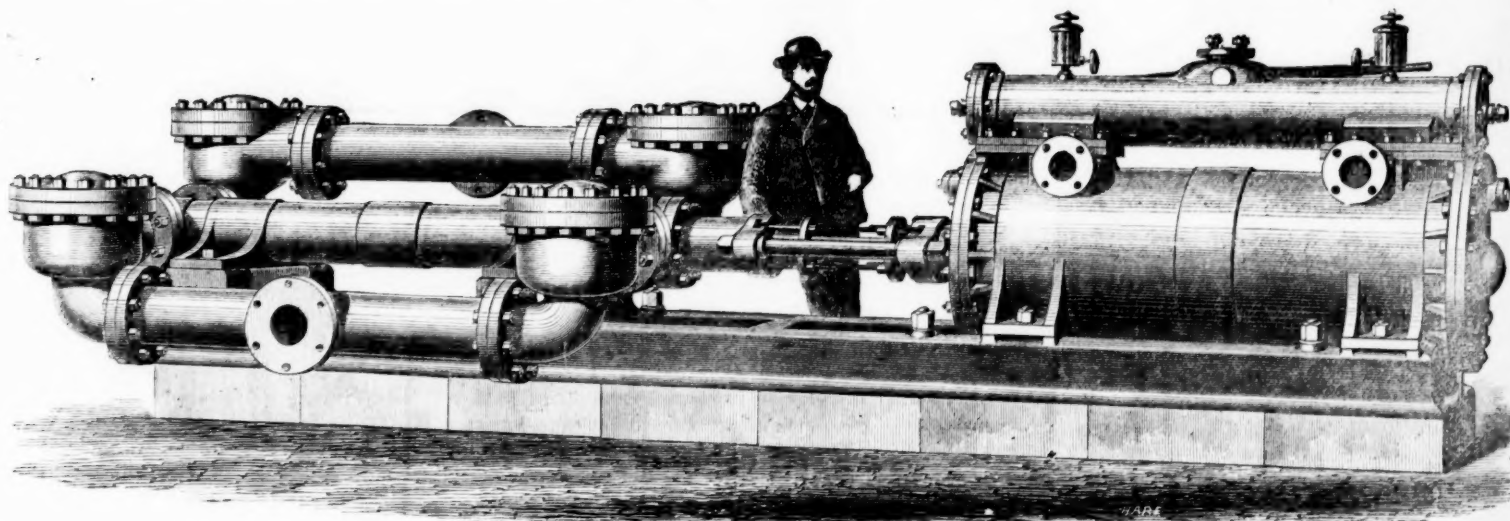
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DIRECT-ACTING STEAM PUMP.



ALSO
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Over THREE THOUSAND of the SPECIAL STEAM PUMPS have been sold by Messrs. TANGYER since their introduction in 1867, which greatly exceeds the number made by all the rest of the Horizontal Direct-Acting Steam-Pump Makers in this country put together. This indisputable fact is the only real test of the merits and superiority of the pump.

The DESIGN, WORKMANSHIP, and comparatively LOW PRICE of TANGYE'S NEWLY DESIGNED HORIZONTAL STEAM ENGINES have called for universal admiration, and UPWARDS of EIGHT HUNDRED of them have been sold since their introduction in 1869.

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